# INSTRUCTION MANUAL

# INSTRUCTION MANUAL

EMR 4530 DUAL
VOLTAGE-CONTROLLED OSCILLATOR
(REVISION B)

EMR
Schlumberger

EMR TELEMETRY
WESTON INSTRUMENTS, INC.
BOX 3041•SARASOTA, FLORIDA 33578
• 813-958-0811 •

PRINTED JULY 1970

COPYRIGHT © 1973 EMR TELEMETRY, WESTON INSTRUMENTS, INC.

Digitized by the Internet Archive
in 2025

https://archive.org/details/manualsplus_09493

## NOTICE

IN THE EVENT THIS EQUIPMENT MUST BE RETURNED TO EMR FOR ANY REASON, SPECIAL CARE MUST BE EXERCISED IN PACKAGING FOR SHIPMENT. CARTON WITHIN A CARTON TYPE PACKING, WITH FOAM SUPPORT AND SEPARATORS IS RECOMMENDED TO PREVENT SHIPPING DAMAGE. SHOULD ANY INFORMATION BE REQUIRED REGARDING PACKAGING OF EMR EQUIPMENT, CONTACT EMR-TELEMETRY, SARASOTA, FLORIDA.

July, 1970

# MANUAL CHANGE NOTICE #1

EFFECTIVITY: Model 4530, serial numbers 81 and up.

DESCRIPTION: Capacitors C1 and C2 shown in drawings 15800, 16131, and 16130 (pages 5-22, 5-23, and 5-24) are changed. Component values and types are listed on the Calibrate Card parts lists in Section 6.

July, 1970

# MANUAL CHANGE NOTICE #2

EFFECTIVITY: Model 4530, serial numbers 88 and up.

DESCRIPTION: Resistors R10 and R96 shown in drawing 15794 on page 5-26 are changed to test variables. See parts list, Section 6, for value range and type.

# LIST OF EFFECTIVE PAGES

Dates of issue for basic and revisions are:

Basic . . . . . February, 1969
Revision A . . . . . May, 1969
Revision B . . . . . July, 1970

Total number of pages in this manual is 93 consisting of the following:

| Page No. | Rev. Letter |
|---|---|
| *Title | B |
| i thru iv | Basic |
| 1-1 thru 1-5 | Basic |
| 2-1 thru 2-4 | Basic |
| 3-1 thru 3-6 | Basic |
| 4-1 thru 4-7 | Basic |
| 5-1 thru 5-24 | Basic |
| *5-25 | B |
| 5-26 | Basic |
| *5-27 | B |
| 6-1 thru 6-18 | Basic |
| *6-19 and 6-20 | B |
| 6-21 | Basic |
| *6-22 and 6-23 | B |
| 6-24 and 6-25 | Basic |
| *6-26 | B |
| 6-27 and 6-28 | Basic |
| *6-29 | B |
| 6-30 | Basic |
| 6-31 | A |
| *6-32 | B |
| 6-33 thru 6-39 | Basic |

* The asterisk indicates pages that changed in the current revision.

TABLE OF CONTENTS


| SECTION | | PAGE |
|---|---|---|
| 1 | GENERAL DESCRIPTION | 1-1 |
| | 1.1 Introduction | 1-1 |
| | 1.2 Functional Description | 1-1 |
| | 1.3 Physical Description | 1-3 |
| | 1.4 System Application | 1-4 |
| 2 | SPECIFICATIONS | 2-1 |
| | 2.1 General | 2-1 |
| | 2.2 Electrical Specifications | 2-1 |
| | 2.2.1 Input Characteristics | 2-1 |
| | 2.2.2 Ouput Characteristics | 2-1 |
| | 2.2.3 Power Requirement | 2-3 |
| | 2.2.4 Calibration Provision | 2-3 |
| | 2.3 Mechanical Specifications | 2-3 |
| | 2.4 Environmental Specifications | 2-3 |
| 3 | INSTALLATION AND OPERATION | 3-1 |
| | 3.1 Installation | 3-1 |
| | 3.2 Operation | 3-1 |
| | 3.2.1 Operating Controls and Monitor Jacks | 3-1 |
| | 3.2.2 Signal Input Configurations | 3-1 |
| | 3.2.3 Operating Information | 3-5 |
| | 3.2.4 Calibration Facilities | 3-5 |
| 4 | THEORY OF OPERATION | 4-1 |
| | 4.1 General | 4-1 |
| | 4.2 Calibrate Card | 4-1 |
| | 4.2.1 EMR 4530-X1-Series Calibrate Card | 4-1 |
| | 4.2.2 EMR 4530-X2-Series Calibrate Card | 4-1 |
| | 4.2.3 EMR 4530-X3- and -X4-Series Calibrate Card Card | 4-2 |
| | 4.3 Voltage-Controlled Oscillator (VCO) Card | 4-2 |
| | 4.4 Power Supply Components and Regulator Card | 4-5 |
| 5 | MAINTENANCE | 5-1 |
| | 5.1 General | 5-1 |
| | 5.2 Maintenance Guide | 5-1 |
| | 5.2.1 Inspection | 5-1 |
| | 5.2.2 Troubleshooting | 5-2 |

TABLE OF CONTENTS (CONT'D.)


| SECTION | | | PAGE |
|---|---|---|---|
| 5 (CONT'D.) | 5.3 | Adjustments | 5-4 |
| | 5.3.1 | Calibrate Card Adjustments | 5-4 |
| | 5.3.2 | VCO Card Adjustments | 5-5 |
| | 5.4 | Drawings | 5-7 |
| 6 | | PARTS LIST AND RECOMMENDED SPARES | 6-1 |
| | 6.1 | General | 6-1 |
| | 6.2 | Parts List Description | 6-1 |
| | 6.2.1 | Variable Chart | 6-1 |
| | 6.2.2 | Parts List | 6-1 |
| | 6.3 | Recommended Spares | 6-2 |
| | 6.4 | Provisioning Considerations | 6-2 |
| | 6.5 | Ordering Instructions | 6-3 |

# LIST OF ILLUSTRATIONS


| FIGURE | | PAGE |
|---|---|---|
| 1-1 | EMR 4530 Simplified Block Diagram | 1-2 |
| 1-2 | Typical System Application | 1-5 |
| 3-1 | EMR 4530 External Electrical Connections | 3-2 |
| 3-2 | EMR 4530 Front Panel Components | 3-3 |
| 4-1 | VCO Card Detailed Block Diagram | 4-3 |
| 4-2 | Power Supply and Regulator Detailed Block Diagram | 4-7 |
| | Model 4530 Dual Oscillator Assembly (14991) | 5-15 |
| | Model 4530 Dual VCO Chassis Assembly (14992) | 5-16 |
| | Interconnection Printed-Wiring Assembly (15908) | 5-17 |
| | Front Panel Assembly (14990) | 5-18 |
| | Regulator Printed-Wiring Assembly (15799) | 5-19 |
| | Regulator Printed-Wiring Schematic (15797) | 5-20 |
| | Calibrate Printed-Wiring Assembly (15906) | 5-21 |
| | Calibrate Card Without Calibration Printed-Wiring Schematic (15800) | 5-22 |
| | Calibrate Card External Calibrate Printed-Wiring Schematic (16131) | 5-23 |
| | Calibrate Card Internal Calibrate Local or Remote Control Printed-Wiring Schematic (16130) | 5-24 |
| | VCO Printed-Wiring Assembly (15796) | 5-25 |
| | VCO Printed-Wiring Schematic (15794) | 5-26 |
| | Model 4530 System Schematic (16135) | 5-27 |
| | Model 4530 Variable Chart (14993) | 6-5 |

# LIST OF TABLES


| TABLE NO. | | PAGE |
|---|---|---|
| 2-1 | EMR 4530 Model Number Identification | 2-4 |
| 3-1 | EMR 4530 Function of Front Panel Components | 3-4 |
| 5-1 | Regulator Card Transistor Voltage Measurements | 5-9 |
| 5-2 | VCO Card Voltage Measurements and Waveforms | 5-10 |
| 5-3 | EMR 4530 Drawings | 5-14 |
| 6-1 | Parts List Breakdown | 6-4 |
| | Oscillator Assembly (14991) | 6-6 |
| | Oscillator Assembly (14991-1) | 6-7 |
| | Oscillator Assembly (14991-2) | 6-8 |
| | Oscillator Assembly (14991-3) | 6-9 |
| | Oscillator Assembly (14991-4) | 6-10 |
| | Chassis Assembly (14992) | 6-11 |
| | Chassis Assembly (14992-1) | 6-13 |
| | Panel Assembly (14990) | 6-14 |
| | Power Supply Regulator Printed-Wiring Assembly (15799) | 6-15 |
| | Calibrate Card No Calibration Printed-Wiring Assembly (15906) | 6-19 |
| | Calibrate Card External Calibrate Printed-Wiring Assembly (15906-1) | 6-20 |
| | Calibrate Card External Calibrate Printed-Wiring Assembly (15906-2) | 6-21 |
| | Calibrate Card Internal Calibrate Printed-Wiring Assembly (15906-3) | 6-22 |
| | Calibrate Card Internal Calibrate Printed-Wiring Assembly (15906-4) | 6-24 |
| | VCO Printed-Wiring Assembly (15796) | 6-26 |
| 6-2 | Recommended Spares List | 6-34 |
| 6-3 | Vendor List | 6-37 |
| 6-4 | Customer Provisioning Questionnaire | 6-39 |

# SECTION 1

# GENERAL DESCRIPTION

## 1.1 INTRODUCTION

This manual contains information describing the EMR 4530 Dual Voltage-Controlled Oscillator. Included in this information are functional and physical descriptions, system application, specifications, installation and operation instructions, theory of operation, maintenance data, and replaceable and spare parts list. Several configurations of the 4530 are available for particular applications. The various configurations are outlined in the model number identification in Table 2-1.

## 1.2 FUNCTIONAL DESCRIPTION

The 4530 is a precision solid-state unit designed for use as a subcarrier link between data source devices and data reduction or recording instruments. Included in the 4530 are two voltage-controlled oscillators (VCO's) which are completely independent in operation. Each VCO operates at a particular subcarrier channel center frequency and deviation. These parameters are established by plug-in VCO card assemblies. Center frequency and deviation parameters of each VCO are identified on the front panel.

The 4530 is available for use in constant bandwidth or proportional bandwidth FM telemetry systems. Built-in calibration facilities, under local or remote control, are available in the 4530. These facilities are described in Table 2-1 and in Section 3 of this manual.

Regulated power for operation of the 4530 is provided by an internal power supply and regulator. The power supply and regulator is available for operation from various primary power sources. These are identified in Table 2-1. Also, the 4530 may be supplied without a power supply and regulator. In this configuration, the regulated power is supplied by an EMR 4023 Power Supply which is designed to provide operating power to several of EMR's 4000-Series modular units mounted in close proximity.

A simplified block diagram of the 4530 is shown in Figure 1-1. The VCO's in the 4530 operate from single-ended data sources to provide frequency modulated subcarrier outputs. Separate inputs and outputs are provided for each VCO. Data inputs are routed from the rear connector to the calibrate card. Circuits on this card vary depending on the particular 4530. Certain units contain calibration relays which interrupt the data inputs and provide calibration voltages to the VCO's. Internal or remote calibration commands control the calibrate relays. Calibration voltages are derived from internal or external voltage sources again depending on the particular unit.

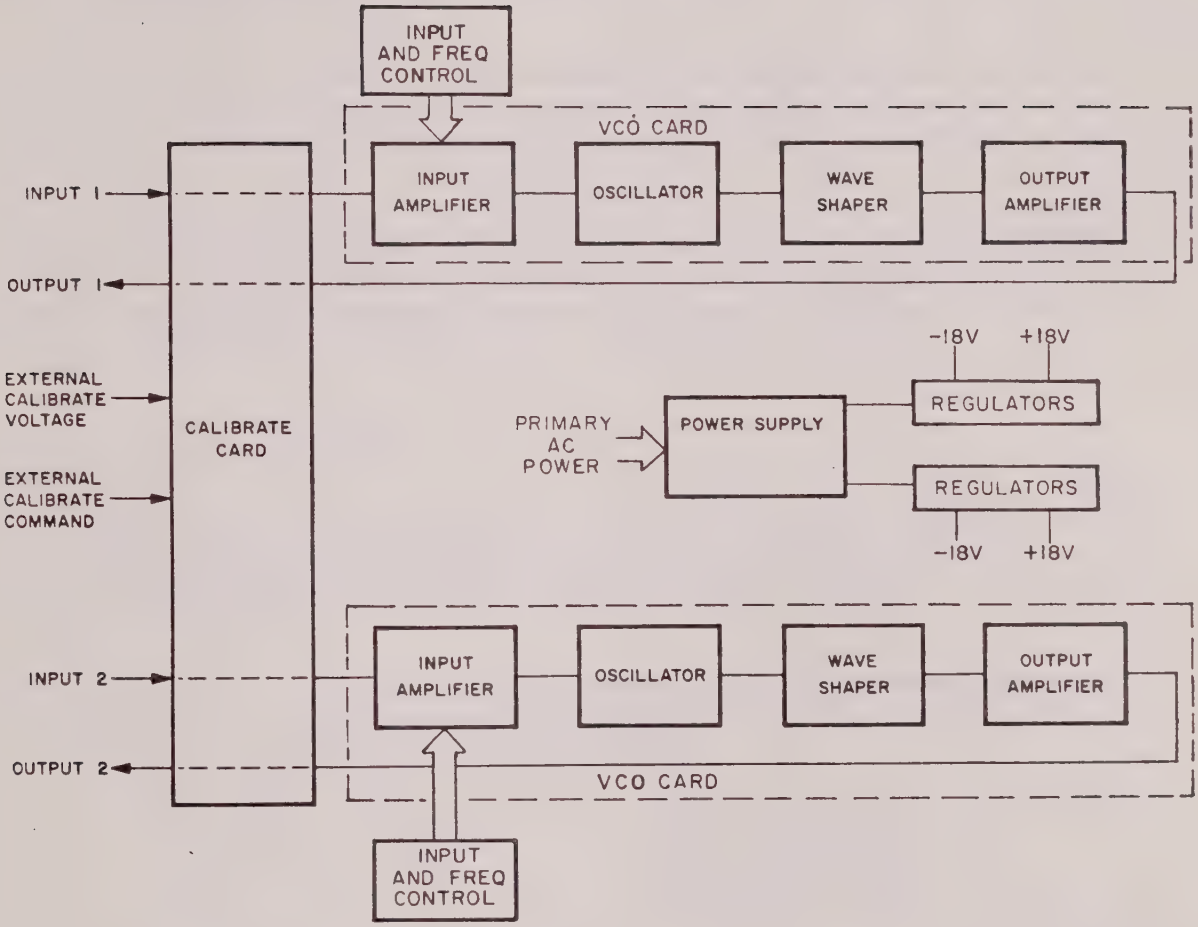



Figure 1-1. EMR 4530 Simplified Block Diagram

Quiescent conditions for the VCO's are established in the input amplifier circuit on the VCO card. Data signals up to 10-volts peak-to-peak are accommodated and any data signal up to this limit can be used to deviate the VCO from bandedge-to-bandedge. The input level adjustment in the input amplifiers is performed at the INPUT controls. The input amplifiers may be offset such that the signal outputs to the oscillators are at levels necessary to offset the oscillator frequencies to a bandedge of the selected subcarrier channel. This adjustment is performed at the FREQ controls.

The oscillators are triangular wave generators which operate at the nominal frequency of the selected subcarrier channel. Subcarrier frequencies within the subcarrier channel are controlled by an input voltage from the input amplifier.

Waveshaper circuits provide cornering to convert the triangular wave signals to sine wave subcarrier signals. The waveshaper outputs are coupled through OUTPUT level controls and output amplifier circuits to the 4530 outputs. The OUTPUT level controls provide continuous adjustment of the subcarrier outputs from 0.2 volt RMS to not less than 2 volts RMS (open circuit).

## 1.3 PHYSICAL DESCRIPTION

The 4530 is a modular unit designed for mounting in an EMR 4005 Rack Adapter. One modular width of the rack adapter is required for mounting the 4530. (Refer to the EMR 4005 Rack Adapter Instruction Manual for information describing the rack adapter.)

The 4530 consists of five major subassemblies. These subassemblies are shown on the top assembly drawing 14991 in Section 5 of this manual. The five major subassemblies are listed as follows:

| | | |
|---|---|---|
| Chassis Assembly | -- | Item 1 on drawing 14991; shown independently in drawing 14992 of Section 5. |
| Front Panel Assembly | -- | Item 2 on drawing 14991; shown independently in drawing 14990 of Section 5. |
| Regulator Card Assembly | -- | Item 6 on drawing 14991; shown independently in drawing 15799 of Section 5. |

Calibrate Card Assembly -- Item 7 on drawing 14991; shown independently in drawing 15906 of Section 5.

VCO Card Assemblies -- Item 8 on drawing 14991; shown independently in drawing 15796 of Section 5.

Although several configurations of the 4530 are available, all units are generally the same in physical layout. All units except the 4530-9X series contain a complete complement of subassemblies as listed above. The 4530-9X series does not have an internal power supply; therefore, the power supply components and regulator card are not included. The remaining 4530 configurations differ only in the type of calibration facilities included. The various calibration facilities are provided by including wiring in the unit and adding components to the calibration card.

## 1.4 SYSTEM APPLICATION

A typical system in which the 4530 may be used is shown in Figure 1-2. This diagram also illustrates other EMR equipments available which may be used in conjunction with the 4530.

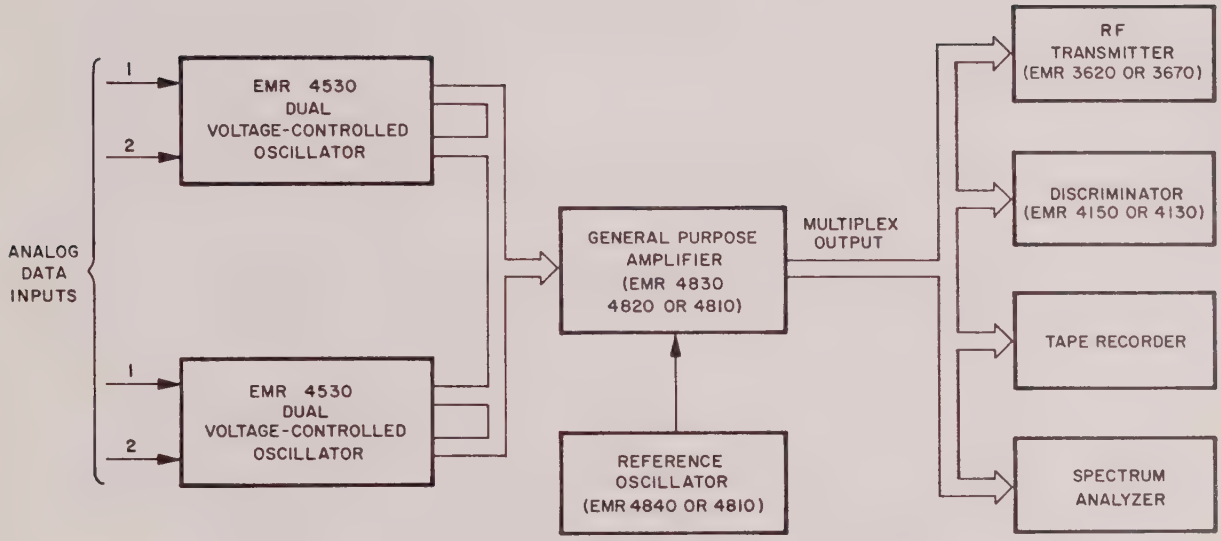



Figure 1-2. Typical System Application

# SECTION 2

# SPECIFICATIONS

## 2.1 GENERAL

This section contains the electrical, mechanical, and environmental specifications for the EMR 4530. Also included is a model number identification table (Table 2-1) which contains the complete model number of the unit and a description of each digit in the model number.

## 2.2 ELECTRICAL SPECIFICATIONS

### 2.2.1 Input Characteristics

a. Input Impedance: Not less than 100K ohms shunted by not more than 100 Pf.

b. Input Signal Amplitude Range: 1.0 to 10.0 volts peak-to-peak for full bandwidth deviation. Adjustable with front panel control.

c. Deviation Polarity: Positive.

d. Deviation Limiting: With input levels of up to 500% of full-scale input, frequency deviation is limited to not more than 15% of full bandwidth beyond bandedge.

e. DC Offset: Continuously variable from high-to-low bandedge.

### 2.2.2 Output Characteristics

a. Center Frequency: Proportional or constant bandwidth channels with center frequencies of 300 Hz through 1.5 MHz.

b. Deviations: ±2% through ±40%.

c. Center Frequency Stability: Center frequency drift is not more than ±0.05% of center frequency for 15 hours at a constant temperature (±3°C) after a 15-minute warm-up. Zero-input frequency will drift no more than ±0.01% per °C average over the ambient temperature range of +10°C to +50°C.

d. Bandwidth Stability: Bandwidth drift is not more than ±0.20% of full-scale deviation for 15 hours at a constant temperature (±3°C) after a 15-minute warm-up. With an ambient temperature of +10°C to +50°C, bandwidth drift is no more than ±0.025% per °C average.

e. Static Linearity: Best straight line non-linearity is not more than ±0.1% of bandwidth.

f. Intelligence Response: For frequencies corresponding to a modulation index of 2 or more, the change in intelligence response is not more than ±0.5 Db from DC up to 100 KHz. At 500 KHz, the intelligence response is down by not more than 3 Db from that measured at DC.

g. Intelligence Distortion: In a system with a deviation ratio of 5, the intelligence distortion is not more than 0.5% at any frequency up to cutoff.

h. Overload Recovery: For a 500% overload of any duration and at any sensitivity, the output frequency returns to within ±0.1% of final value in not more than 5 microseconds or one carrier cycle period, whichever is greater.

i. Amplitude Modulation: Amplitude modulation of the sine wave output for any deviation is not more than 0.5 Db.

j. Subcarrier Distortion: At any deviation, the harmonic distortion of the subcarrier output is not more than 1% for individual harmonics not more than 1.5 MHz.

k. Sine Wave Output: Continuously adjustable at the front panel from 0.2 volt RMS to not less than 2 volts RMS open circuit.

l. Line Voltage Sensitivity: A 10-volt change in line voltage within the operating range of 105 to 132 volts causes a change in center frequency of not more than ±0.02%, and a change in bandwidth of not more than ±0.1%.

m. Output Noise: FM noise output is not more than 0.1% of full bandwidth RMS as measured in a deviation-ratio-of-5 system.

n. Output Impedance: Standard output impedance is 220 ohms ±10% for direct resistive mixing. An internal jumper may be added to change the impedance to 50 ohms ±10%.

### 2.2.3 Power Requirement

The input power requirements are listed in Table 2-1. The unit is fused from the AC power input with a 1 amp fuse for 120-volt operation and with a 500 milliamp fuse for 220-volt operation.

### 2.2.4 Calibration Provision

The various calibration provisions are described in Table 2-1. Internal calibration voltages are within ±0.2% of full-scale voltages specified in Table 2-1.

## 2.3 MECHANICAL SPECIFICATIONS

a. Height: 5-1/4 inches (13.3 Cm).

b. Width: 1.22 inches (3.10 Cm).

c. Depth: 16.75 inches, excluding front panel projections.

d. Weight: Net, 3-1/8 pounds (1.42 Kg); shipping, 5 pounds (2.27 Kg).

e. Panel Finish: Several paint colors are available as listed in Table 2-1.

f. Mounting: The unit is designed for mounting in an EMR 4005 Rack Adapter. The rack adapter occupies 5-1/4 inches by 19 inches (13.3 Cm by 48.2 Cm) in a standard equipment rack.

## 2.4 ENVIRONMENTAL SPECIFICATIONS

a. Temperature: Operating, +10°C to +50°C; storage, −55°C to +85°C.

b. Altitude: 0 to 50,000 feet.

c. Relative Humidity: 5% to 95%.

d. Vibration: Non-operating, per MIL-STD-810A, method 514, equipment class 6, Figure 514-6, curve A.

e. Shock: Non-operating, per MIL-STD-810A, method 516, procedure III.

Table 2-1. EMR 4530 Model Number Identification

| a | b | c | d | e | f | g | h |
|---|---|---|---|---|---|---|---|
| 4530 - XX | - XXXX.XXX | - XXX.XX | - XXXX.XXX | - XXX.XX | - XX.XX | - XX.XX | - XX |

a. First Digit: Input power identification.

0 -- 105 to 132 volts RMS, 47 to 65 Hz.
7 -- 105 to 132 volts RMS, 360 to 440 Hz.
8 -- 230 volts RMS ±10%, 47 to 63 Hz.
9 -- No power supply included, requires ±18 volts supplied by external supply, such as an EMR 4023 Power Supply.

Second Digit: Oscillator Configuration.

1 -- No calibration.
2 -- External calibration source, remote control.
3 -- Internal calibration source, remote control.
4 -- Internal calibration source, local control.

b. VCO 1 center frequency in 7-digit KHz.

c. VCO 1 peak deviation in 5-digit % for PBW subcarrier channels or 5-digit KHz for CBW subcarrier channels.

d. VCO 2 center frequency in 7-digit KHz.

e. VCO 2 peak deviation (same as VCO 1).

f. Negative Calibrate Voltage: For 4530-X3 and X4, negative calibrate voltage in 4-digit volts.

g. Positive Calibrate Voltage: For 4530-X3 and X4, positive calibrate voltage in 4-digit volts.

h. Panel Paint Code:

01 -- Light green 00048W
02 -- Dark green 00049W
04 -- Gray 26492B
99 -- Special

# SECTION 3

# INSTALLATION AND OPERATION

## 3.1 INSTALLATION

The EMR Model 4530 Dual Voltage-Controlled Oscillator is shipped completely assembled and is ready for mounting. The unit should be inspected immediately on its arrival and notice given to EMR-Telemetry of any claim that the product does not conform with the terms of the order.

The Model 4530 is a modular unit designed for mounting in an EMR Model 4005 Rack Adapter. The modular unit is positioned on T-rails on the bottom surface of the rack adapter interior and is inserted into the mounting location. A push-to-lock knob on the front panel is depressed securing the unit in the mounting location of the rack adapter. The unit rear connector J1 mates with a receptacle in the rack adapter interior completing the electrical connections.

Information illustrating the position of the unit in the rack adapter and internal wiring of the rack adapter is contained in the EMR Model 4005 Rack Adapter Instruction Manual. The Model 4530 rear connector J1 and the external connections terminated at J1 are illustrated in Figure 3-1.

Internal cooling for the Model 4530 is provided by a blower mounted vertically on the rack adapter rear panel.

## 3.2 OPERATION

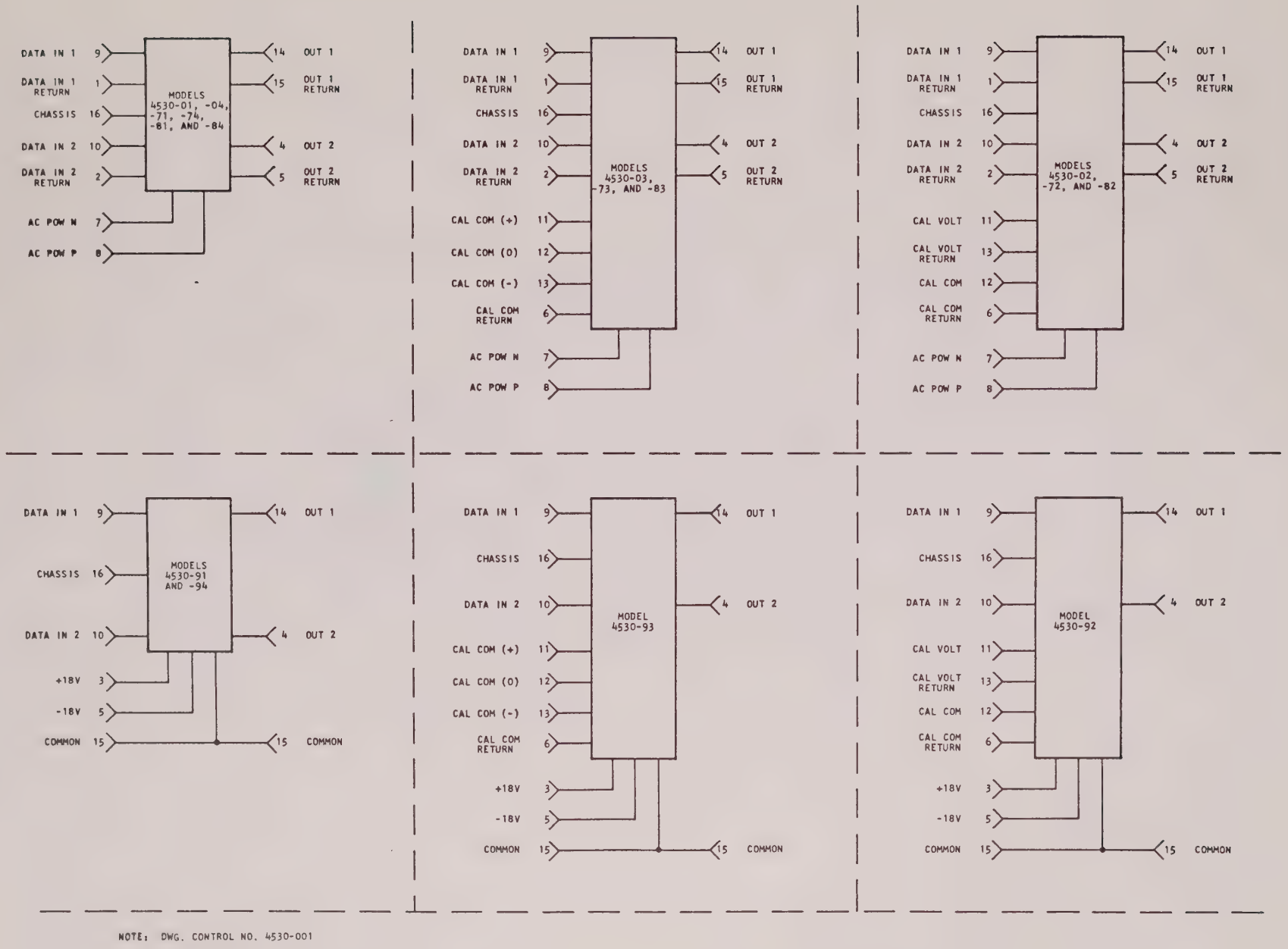
### 3.2.1 Operating Controls and Monitor Jacks

The operating controls and monitor jacks used for operation of the Model 4530 are illustrated in Figure 3-2 and described in Table 3-1.

### 3.2.2 Signal Input Configurations

The 4530 VCO's operate independently from single-ended data sources. For certain 4530 design sequences, two separate inputs (input and input return) to each VCO are provided. The remaining 4530 design sequences contain only one input and a unit common input. However, for both types of units, the data signal input must be applied to the input terminal. The input return and unit common connections are signal ground inputs.

The deviation sense of the VCO's is positive in that a positive voltage applied at the input will yield a frequency increase at the output. A negative voltage applied at the input will yield a frequency decrease at the output.




NOTE: DWG. CONTROL NO. 4530-001

Figure 3-1. EMR 4530 External Electrical Connections

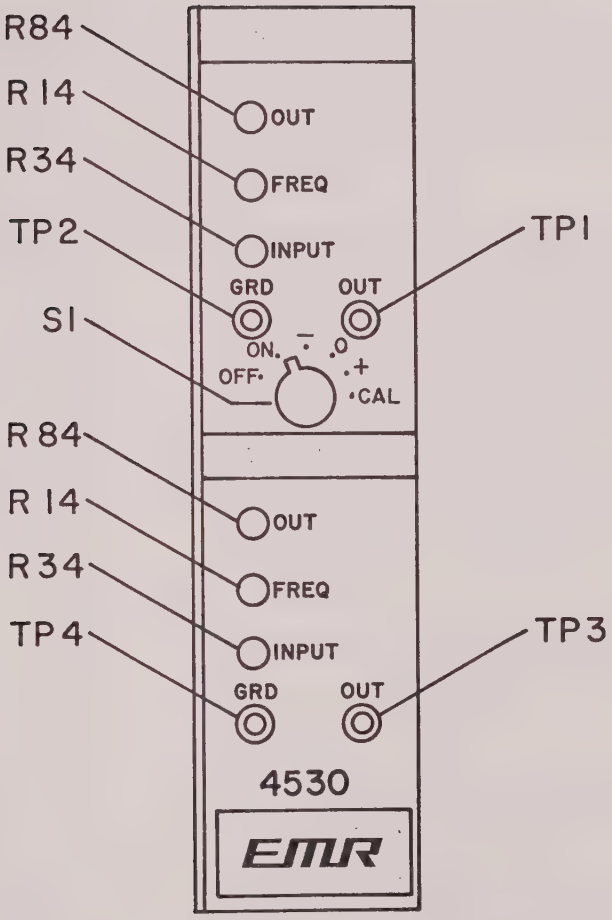



Figure 3-2. EMR 4530 Front Panel Components

Table 3-1. EMR 4530 Function of Front Panel Components
(Ref. Figure 3-2)

| DESIG. | NAME | FUNCTION |
|---|---|---|
| R84 | OUT control | Adjusts the amplitude of the VCO output. The top R84 is for VCO #1 and the bottom R84 is for VCO #2. |
| R14 | FREQ control | Adjusts the VCO frequency. This control permits continuous adjustment of the VCO frequency from LBE to HBE. The top R14 is for VCO #1 and the bottom R14 is for VCO #2. |
| R34 | INPUT control | Adjusts the full-bandwidth deviation voltage input of the VCO up to 10-volts peak-to-peak. The top R34 is for VCO #1 and the bottom R34 is for VCO #2. |
| TP2 | GRD test jack | Output return for VCO #1. |
| S1 | Control switch | Provides OFF/ON control for all 4530's and provides local calibrate selection for the 4530-X4. Calibrate positions are as follows:<br><br>CAL (–) -- Both VCO's in calibrate mode and negative calibrate voltage input.<br><br>CAL (0) -- Same as CAL (–) except zero calibrate voltage input.<br><br>CAL (+) -- Same as CAL (–) except positive calibrate voltage input. |
| TP4 | GRD test jack | Output return for VCO #2. |
| TP3 | OUT test jack | VCO #2 output test jack. |
| TP1 | OUT test jack | VCO #1 output test jack. |

### 3.2.3 Operating Information

In the data mode of operation, the two VCO's in the 4530 operate independently from two separate sources. Separate inputs, outputs, and front panel operating controls are provided for each VCO. In a calibrate mode of operation, the VCO inputs are both switched to operate from a single calibrate input source. The mode of operation is selected either at the front panel or remotely depending upon the particular 4530 design sequence. Various calibration facilities are described in paragraph 3.2.4.

The initial set up of the VCO's is dependent upon the particular application. The following general steps are provided to assist the operator in the set up of the 4530.

a. Positive Data Sources: When the data sources on which the VCO's are to operate are positive, the quiescent VCO frequencies should be offset to a frequency corresponding to low bandedge (LBE). This offset adjustment is performed with the front panel FREQ controls. The positive-going data signal thus drives the VCO frequency to high bandedge (HBE). The expected peak amplitude of the data signal should be determined and the VCO input level set such that this peak data signal will deviate the VCO to full bandwidth. The VCO input level is adjusted with the front panel INPUT controls.

b. Negative Data Sources: Set up is the same as step (a) above except that the quiescent VCO frequencies should be offset to HBE. Thus, the negative data signals drive the VCO frequencies to LBE.

c. Bipolar Data Sources: For bipolar data signal sources, the VCO's are set to operate at center frequency and the bipolar data signals deviate the VCO frequencies to HBE and LBE. The quiescent VCO frequencies are again set using the front panel FREQ controls. The expected peak-to-peak amplitude of the data signal sources are used in determining the INPUT level adjustment.

### 3.2.4 Calibration Facilities

The 4530 is available in four calibration configurations. These configurations are described as follows:

a. 4530-X1 -- No built in calibration. Initial set up and calibration is performed via the data inputs to the unit by external equipments.

b. 4530-X2 -- Calibration relays are included which are controlled by a remote calibration command to switch the data inputs to the VCO's to a single calibration voltage input. Calibration voltage input must be supplied by an external source. The required calibration voltage is dependent upon the quiescent settings of the VCO's. The remote calibration command voltage required is +24 volts ±6V DC.

c. 4530-X3 -- Calibration relays are included which are controlled by a remote calibration command to switch the data inputs to the VCO's to a single calibration voltage input. The calibration voltage is derived from a built-in voltage divider. This voltage divider provides specified voltages for (−), (0), and (+) calibration selection. The calibration voltages are established by the customer in the ordering information (See Table 2-1). The remote calibration command voltage required is +24 volts ±6 V DC.

d. 4530-X4 -- Same as the 4530-X3 except that the calibrate mode and calibrate selection are performed at the front panel control switch. The calibration voltages are established by the customer in the ordering information (See Table 2-1).

# SECTION 4

# THEORY OF OPERATION

## 4.1 GENERAL

This section contains the detailed theory of operation for the EMR 4530. The theory discussion is presented at the card level with reference to schematic diagrams in Section 5 and, where appropriate, to detailed block diagrams in this section. A general description and simplified block diagram of the 4530 are contained in Section 1 of this manual. The user should be thoroughly familiar with the general information in Section 1 before proceeding to this theory discussion.

## 4.2 CALIBRATE CARD

Four calibrate card configurations are used in the 4530. The particular configuration used is dependent on the design sequence. These four configurations are described in the following paragraphs.

### 4.2.1 EMR 4530-X1-Series Calibrate Card

The calibrate card used in these units is shown schematically in EMR drawing 15800 in Section 5 of this manual. This card does not contain any calibration components and is used only as a jumper card. Data inputs and input commons for both VCO's and the subcarrier outputs from the VCO's are routed through this card. Output transformers are included on all cards (except the 4530-91) which provide floating subcarrier outputs. Subcarrier outputs for the 4530-91 are direct coupled and are thus single-ended.

### 4.2.2 EMR 4530-X2-Series Calibrate Card

The calibrate card used in these units is shown schematically in EMR drawing 16131 in Section 5 of this manual. This card contains calibration relays which interrupt the separate data inputs to the VCO's and instead connects a calibration voltage input to both VCO's. Both the data input and input return are switched to an external calibrate input and calibrate input return. The calibration voltage is supplied from external devices. Switching is performed by calibrate commands also derived from external equipments.

Subcarrier outputs from the VCO's are routed through this card to the 4530 outputs. Transformer coupling at the outputs (for all but the 4530-92) provides floating subcarrier outputs. For the 4530-92, the output transformers are not included and the jumpers are installed instead providing single-ended outputs.

### 4.2.3 EMR 4530-X3- and -X4-Series Calibrate Card

The calibrate card used in these units is shown schematically in EMR drawing 16130 in Section 5 of this manual. This card contains a built-in calibration network and switching relays which interrupt the separate data inputs to the VCO's and instead connects the calibration voltages to the VCO's. The calibration network consists of two voltage dividers operating from the + and −18 volt regulated DC source. These networks are connected to the plus and minus calibration relays. Calibration commands (+, −, and 0) are derived either from the front panel CAL switch or from an external source, depending on the particular 4530. For the 4530-X3, calibration commands are derived from an external source. Calibration commands for the 4530-X4 are selected at the front panel CAL switch. Subcarrier outputs from both VCO's are also routed through this card.

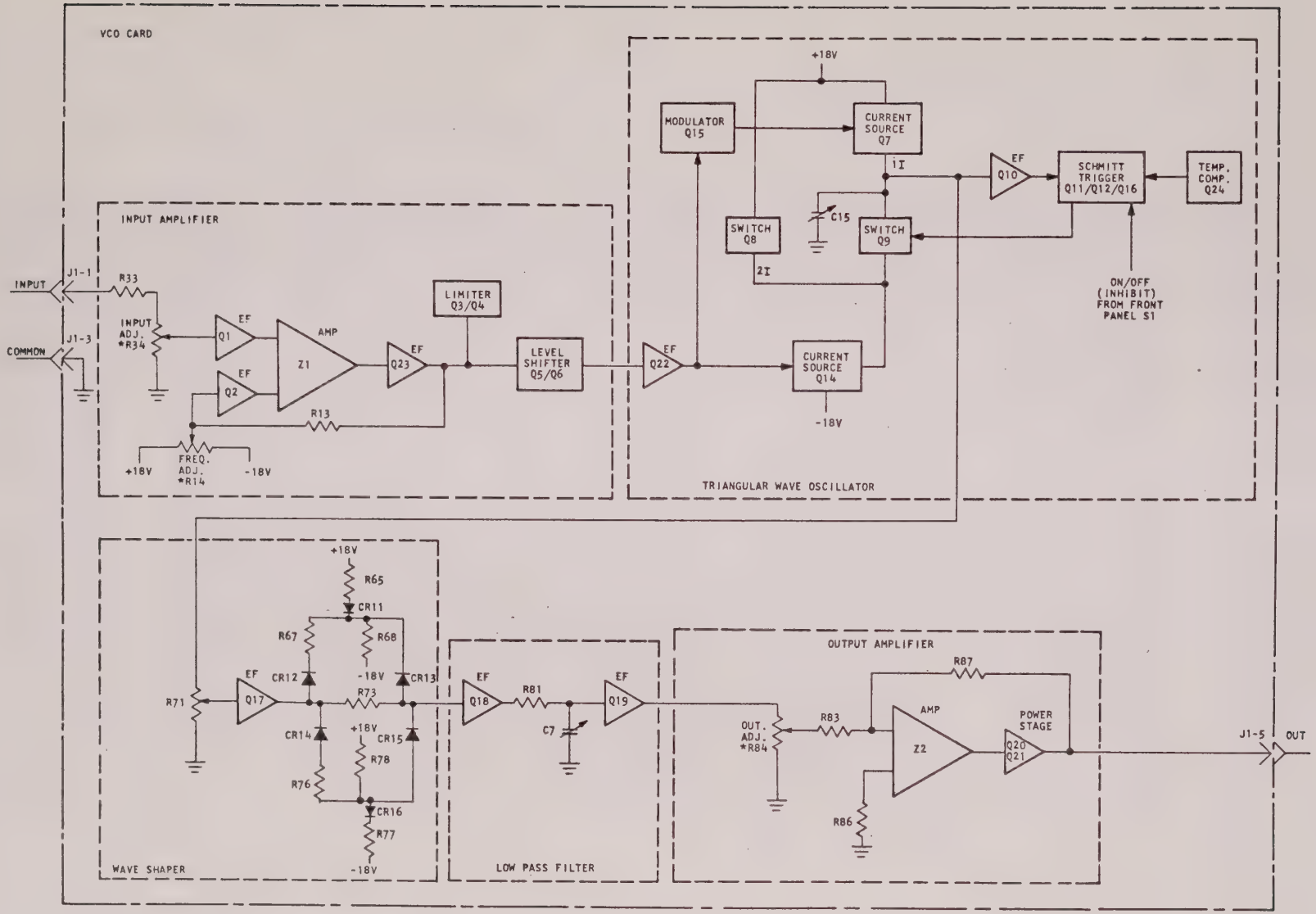
Transformer coupling is used for the 4530-X3 and -X4 VCO outputs (except the 4530-93 and -94 versions) which provides floating subcarrier outputs. For the 4530-93 and -94 versions, jumpers are installed instead of the transformers and the subcarrier outputs are thus single-ended.

## 4.3 VOLTAGE-CONTROLLED OSCILLATOR (VCO) CARD

The 4530 contains two identical subcarrier oscillators, each located on a VCO card. Therefore, the circuit description in this paragraph is used for either of the VCO cards. An overall block diagram of the VCO card is shown in Figure 4-1. The schematic diagram for the VCO card is shown in EMR drawing 15794 in Section 5 of this manual.

The VCO input is routed through card terminal J1 pin 1 to the INPUT control R34. This resistor adjusts the gain of amplifier (Z1) such that any input signal from 1 volt peak-to-peak to 10 volts peak-to-peak may be used to provide an output to the oscillator corresponding to full-bandwidth deviation. A second input to Z1 is an offset level established by FREQ control R14. This control provides continuous offset adjustment of the amplifier to either bandedge equivalent. A limiter circuit, Q3 and Q4, establishes the maximum voltage swing at the amplifier output. Positive and negative stages in the limiter are triggered when the voltage level increases or decreases to the reference level established in the limiter. This limiting action prevents the oscillator from being over deviated. A level shifting stage, Q5 and Q6, changes the modulating voltage levels to the level necessary for proper operation of the oscillator.

The oscillator is a triangular wave generator which is set to operate at a nominal frequency of the selected subcarrier channel. Operating frequencies within the subcarrier channel are controlled by an input voltage from the input amplifier circuits. In the quiescent state (no input from the input amplifier circuits), the operation of the oscillator is as follows:




NOTES:

1. *--ADJUSTMENTS AS VIEWED FROM FRONT PANEL.
2. DWG. CONTROL NO. 4530-002.

Figure 4-1. VCO Card Detailed Block Diagram

a. Transistor switch Q8 is closed and Q9 is open. Two units of constant current are drawn by current source Q14 through switch Q8. Simultaneously, one unit of constant charging current charges C15 from current source Q7.

b. Constant charging current in C15 produces a linear ramp voltage at the output which is coupled through emitter-follower Q10 to Schmitt trigger Q11, Q12, and Q16. When this voltage increases to a specified level, the Schmitt trigger turns on and supplies an output which closes switch Q9.

c. When Q9 is closed, switch Q8 is automatically opened due to the coupling between Q8 and Q9. The two units of current through Q14 must, in this condition, flow through switch Q9. Since current source Q7 provides only one unit of current, the second unit of current flows from capacitor C15 which is the discharge current for C15. Since the discharge current is also constant, the ramp voltage at C15 decreases linearly.

d. The linear decrease in ramp voltage at C15 is monitored by the Schmitt trigger. When this voltage decreases to a specified level, the Schmitt trigger turns off and opens switch Q9. Switch Q8 is again closed and one oscillator cycle is complete. This process repeats for each cycle of the oscillator.

e. The frequency of the oscillator is established by timing capacitor C15. Increasing or decreasing the value of this capacitor, in turn, increases or decreases the time required to charge and discharge, thus determining the slope of the ramp voltage. The peak-to-peak amplitude of the triangular wave is held constant by the switching level of the Schmitt trigger, therefore, a change in slope represents a change in frequency.

f. The levels at which the Schmitt trigger are operated are determined primarily by zener diode CR7 and the amount of current drawn by current source Q16.

g. A temperature compensation network, Q24, operates in conjunction with the Schmitt trigger. This network increases or decreases the biasing in the Schmitt trigger to compensate for enviromental temperature changes.

The oscillator modulation is performed by modulating the current through the current sources. Both current sources are modulated so that the positive-going portion of the ramp voltage is changed when C15 is charged, and the negative-going portion is changed an equal amount when C15 is discharged. This maintains a symetrical triangular wave output which changes only in frequency.

The wave shaper circuits are diode cornering networks which convert the triangular wave subcarrier input to a sine wave signal. This network includes two positive stages and two negative stages which operate on the positive and negative portions, respectively, of the triangular wave subcarrier input. Each stage in the networks is set to turn on when the signal increases to a specified level. This level is the break point of the stage. The break points of the two stages in the networks are staggered such that the first stage turns on at a lower level than the second stage. Thus, when the signal level increases (either positive or negative), the first stage turns on providing a certain rounding effect. As the signal further increases, the second stage turns on and additional rounding is provided. When the signal reverses direction, the stages are thus turned off in reverse order. The turning on of the stages exhibits a load on the signal input which performs the rounding effect. The loading characteristics of the diode and resistor stages are non-linear because of the non-linearity required to produce a sine function.

The output of the wave shaper is essentially a sine wave subcarrier signal; however, a certain peak remains in the waveform due to the instantaneous polarity change at the peak of the triangular wave. To eliminate the remaining distortion in the sine wave subcarrier, the signal is passed through a single-pole low-pass filter network. The resultant signal is developed across OUT potentiometer R84. The signal level selected at this potentiometer is amplified by an amplifier and power stage and routed to the VCO card output terminal J1-5.

## 4.4 POWER SUPPLY COMPONENTS AND REGULATOR CARD

The power supply components and regulator card are included in all 4530's except the 4530-9X series. Regulated DC power for operation of the 4530-9X series is provided from an external power supply. An overall block diagram of the power supply components and regulator card circuits is shown in Figure 4-2. The power supply components are illustrated in detail in the system schematic, EMR drawing 16135, in Section 5 of this manual. The schematic diagram for the regulator card is shown in EMR drawing 15796 also in Section 5.

The primary AC power input is routed through the rear connector J1 and fuse, F1, to the primary winding of T1. Two secondary windings are connected to two full-wave diode rectifiers. These rectifiers supply the unregulated DC voltages for operation of four regulator circuits on the regulator card. Each rectifier supplies power to a +18-volt and a -18-volt regulator.

Since the four regulators are of the same basic configuration, only one +18-volt regulator is shown in the block diagram, Figure 4-2. Each VCO is powered by a separate set of + and -18-volt regulators which are floating with respect to each other. This makes possible independent VCO operation with floating inputs.

The regulators are conventional series regulator circuits. Regulation is performed by comparing a sample of the output potential with a voltage reference developed by zener diode CR3. A differential amplifer, Q3 and Q4, detects any voltage difference and routes a correction voltage back to the series control transistor Q1. This component increases or decreases the biasing of series regulator transistor, Q1, (mounted on the chassis) which compensates for voltage variations at the output.

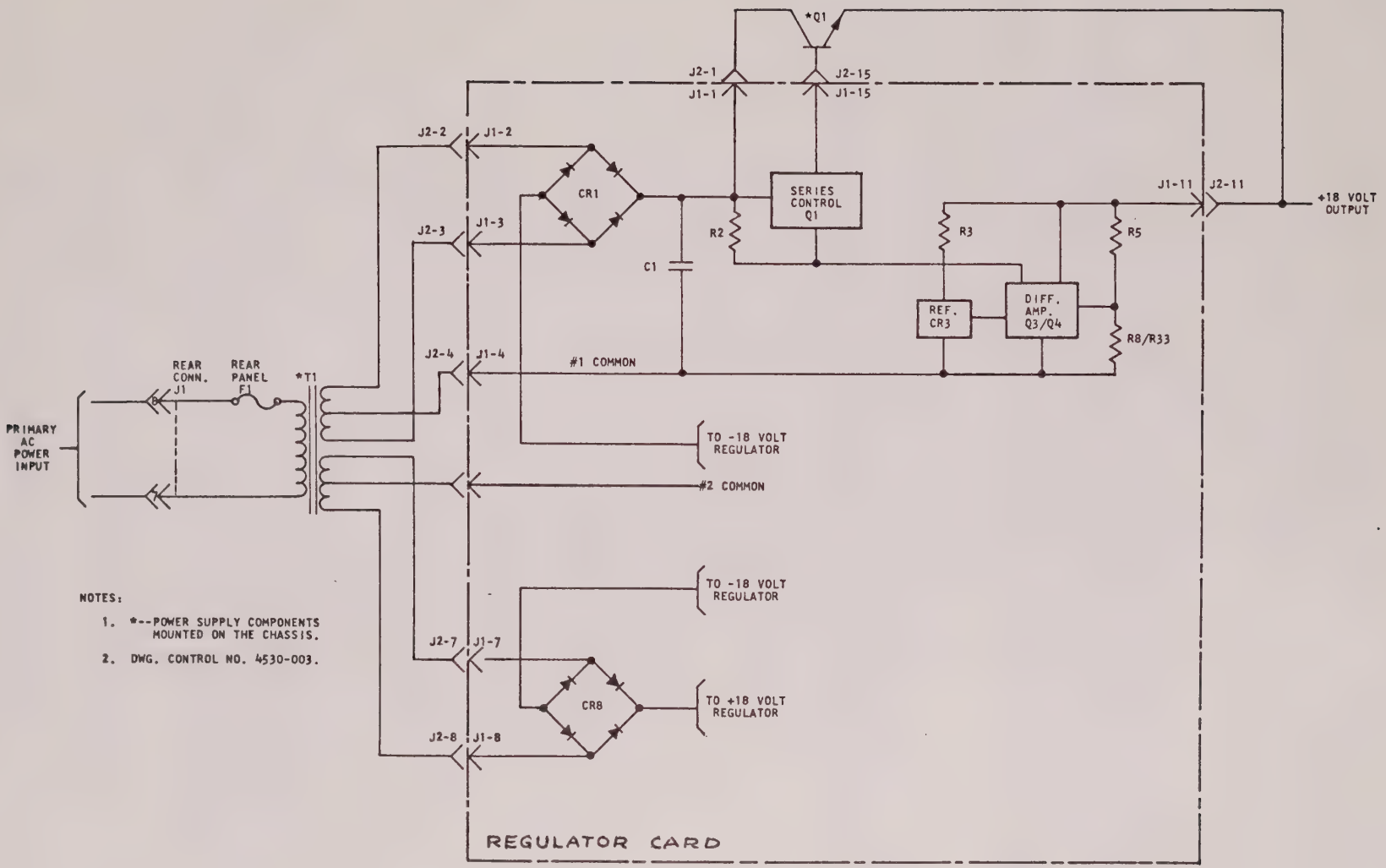



Figure 4-2. Power Supply and Regulator Detailed Block Diagram

# SECTION 5

# MAINTENANCE

## 5.1 GENERAL

This section contains information to aid in maintaining the EMR 4530. The maintenance information includes a Maintenance Guide (paragraph 5.2), Adjustment Procedures (paragraph 5.3), and Drawings (paragraph 5.4). Prior to attempting any maintenance of the 4530, the operator should be thoroughly familiar with the operating procedures and theory of operation as contained in Sections 3 and 4 of this manual.

## 5.2 MAINTENANCE GUIDE

This paragraph outlines the method for troubleshooting and repair of the 4530. In the event an abnormal condition is detected in the unit operation, the following general method of isolating and repairing the trouble is recommended.

a. Perform an inspection (paragraph 5.2.1).

b. Perform troubleshooting procedures (paragraph 5.2.2).

c. When defective component is located, refer to Section 6, Parts List, for replacement component information.

d. Recheck affected circuit to ascertain that the malfunction is repaired.

e. Perform adjustments in affected circuit when necessary (paragraph 5.3).

### 5.2.1 Inspection

The Model 4530 should be subjected to a regular inspection program similar to that recommended for other types of electronic equipment. The inspection program should be performed periodically as a means of preventive maintenance, or if a malfunction occurs, to aid in isolating the trouble. The inspection guide is as follows:

a. Inspect front and rear panel components for signs of damage.

b. Inspect wiring for loose or broken connection.

c. Inspect printed-circuit cards for mechanical damage or component discoloration.

d. Inspect printed-circuit card connectors for signs of damage.

### 5.2.2 Troubleshooting

An electrical malfunction in the 4530 will normally be located on one of the printed-circuit cards in the unit. The following general steps are provided to check the operation of the cards and to isolate a malfunction.

a. Refer to the system schematic diagram, EMR drawing 16135, and check the regulated DC voltage outputs. These voltages should be ±18 volts ±0.1 volt. If the voltages are within tolerance, refer to step (b) of this procedure. If voltages are not within tolerance, refer to the theory description in paragraph 4.4 and to the regulator card transistor voltage measurements in Table 5-1, and troubleshoot the power supply/regulator circuits.

b. The calibrate card configuration varies significantly depending on the particular model of the 4530. However, the card circuits for all configurations are primarily switching networks. Refer to the theory description in paragraph 4.2 and check the switching networks, calibrate inputs (where applicable) or data signal inputs, and subcarrier outputs.

c. The VCO cards contain several functional circuits as shown in the card detailed block diagram, Figure 4-1. To isolate a malfunction on the VCO card, a checkout procedure is provided to check each functional circuit. When in the course of this procedure, a malfunctioning circuit is located, refer to the VCO card schematic diagram (EMR drawing 15794) and VCO card voltage measurement and waveforms table (Table 5-2), and troubleshoot the appropriate circuit. The equipment necessary to perform this procedure is as follows:

1. Signal Generator -- Hewlett Packard 200CD or equivalent.

2. Oscilloscope -- Tektronix 535 or equivalent.

3. Frequency Counter -- Hewlett Packard 5245L or equivalent.

The checkout procedure is as follows:

1. Operate the VCO under test in the data mode with no signal input and no subcarrier output termination.

2. Using the oscilloscope, monitor the junction of resistors R22 and R24 and adjust front panel FREQ control for a 0-volt indication.

3. Using the external signal generator, apply a 500 Hz signal of approximately 10 volts peak-to-peak to the VCO via rear connector signal input terminal.

4. Using the oscilloscope, monitor the junction of resistors R22 and R24 and adjust front panel INPUT control for a 5-volt peak-to-peak indication. This indicates proper operation of the input amplifier.

5. Increase the signal level at the external signal generator and observe that the limiting occurs on both positive and negative peaks at approximately ±3.2 volts. This indicates proper operation of deviation limiting.

6. Remove the signal input from the VCO. The input amplifier check is complete.

7. Using the oscilloscope, monitor the oscillator output at capacitor C15. This output should be a triangular wave subcarrier signal of approximately 4.5 volts peak-to-peak.

8. Connect the frequency counter to the output jack on the oscilloscope. Monitor capacitor C15 and check the oscillator frequency. Frequency should be approximately center frequency of the subcarrier channel.

9. Rotate front panel FREQ control in both directions and monitor the oscillator frequency to ascertain that both bandedge frequencies are obtainable. The oscillator check is complete.

10. Using the oscilloscope, monitor the waveshaper signal at the emitter element of transistor Q18. This signal should be a sine wave subcarrier signal of approximately 0.8 volts peak-to-peak.

11. Using the oscilloscope, monitor the output amplifier input at the input side of resistor R83. This signal amplitude depends on the setting of R84.

12. Using the oscilloscope, monitor the output amplifier output at VCO card OUTPUT terminal J1-5.

13. Rotate front panel OUT control fully clockwise to ascertain that a sine wave subcarrier signal of at least 2 volts RMS is obtainable.

## 5.3 ADJUSTMENTS

The adjustments in this paragraph may be used for readjustment after unit repair or they may be used to checkout and adjust the 4530 after long periods of operation. The procedure is provided at the card level so that any card may be adjusted independently.

Any adjustments contained in the procedure may be performed without specialized equipment. However, adjustments in the unit not contained in the procedure should not be attempted in the field. Specifically, adjustments in the temperature compensation circuit are critical and require special environmental equipments to perform the adjustment. Should adjustment in this circuit be necessary, return the unit to EMR.

A list of the equipments necessary to perform this procedure is as follows:

a. DC Voltmeter, Fluke 825A or equivalent.

b. Frequency Counter, Hewlett Packard 5245L or equivalent.

c. Distortion Analyzer, Hewlett Packard 331A or equivalent.

d. DC voltage source accurate to ±0.1%.

### 5.3.1 Calibrate Card Adjustments

Adjustments are provided only on the calibrate card in the 4530-X3- and -X4- series units. These cards contain adjustments for the built-in calibrator circuits. The calibrator adjustments are as follows:

a. Refer to EMR Drawing 16130.

b. Supply calibration command to CAL COMMAND (+), 24 ±6 volts, either from external equipments or front panel CAL switch depending on the particular unit.

c. Using the DC voltmeter, monitor VCO card 1 input (card terminal J1-1).

d. Determine positive calibration voltage from model number on the unit (See Table 2-1).

e. Adjust calibrate card potentiometer R5 for the specified calibration voltage ±0.2%.

f. Using the DC voltmeter, monitor VCO card 2 input (card terminal J1-1).

g. Adjust calibrate card potentiometer R7 for the specified calibration voltage ±0.2%.

h. Supply calibration command to CAL COMMAND (-).

i. Using the DC voltmeter, monitor VCO card 2 input (card terminal J1-1).

j. Determine negative calibration voltage from model number on the unit (See Table 2-1).

k. Adjust calibrate card potentiometer R13 for the specified calibration voltage ±0.2%.

l. Using the DC voltmeter, monitor VCO card 1 input (card terminal J1-1).

m. Adjust calibrate card potentiometer R11 for the specified calibration voltage ±0.2%.

### 5.3.2 VCO Card Adjustments

Since the two VCO cards are identical, the adjustment procedure as provided in this paragraph may be used for either card. Adjustments on the VCO cards are primarily involved with adjusting the linearity and symetry of the oscillator, and distortion nulling of the waveshaper. Symetry adjustments affect the distortion of the VCO card circuits. Center frequency and deviation parameters for the cards are set at the factory and require no further adjustment. Frequency offset and input level adjustments are performed at the front panel FREQ and INPUT controls. These controls are considered operating components and do not require adjustment procedures. Operating controls are described in Section 3 of this manual.

The VCO card adjustment procedure is provided in four sections, (1) a calibration setup procedure for use in conjunction with the oscillator linearity and symetry adjustments, (2) the oscillator linearity adjustment, (3) the oscillator symetry adjustment, and (4) the waveshaper adjustments. The adjustment procedure is as follows:

a. Oscillator Calibration --

1. Short the VCO input to the input return or unit common at the rear connector.

2. Using the frequency counter, monitor the VCO output at the appropriate front panel test jack.

3. Adjust the front panel FREQ control until the output frequency is equal to the center frequency of the VCO (within ±0. 1%).

4. Remove the input short and apply a positive DC calibration voltage, equal to full scale deviation, at the input. (If the 4530 contains a built-in calibrator, the internal positive calibrate voltage can be used for this input.)

5. Adjust the front panel INPUT control until the output frequency is equal to the upper bandedge of the VCO (within ±0. 1%).

6. Repeat steps 1 through 5 to ascertain that center frequency and upper bandedge frequencies are within ±0. 1% of the specified frequencies.

b. Oscillator Linearity -- This procedure is primarily, applicable for oscillators operating at center frequencies of 50 KHz or above. Some deviation of this rule exists, however. Refer to the VCO card and observe whether a jumper is installed between card terminals E1 and E2. If a jumper is installed, this procedure is not applicable. If a jumper is not installed, proceed as follows:

1. Using the frequency counter, monitor the appropriate front panel test jack.

2. Perform a three-point linearity check (upper bandedge, center frequency, and lower bandedge frequencies) using the positive and negative calibration voltages as established in step (a) of this procedure.

3. If best-straight-line linearity is within 0. 1% of bandwidth, the adjustment is proper. If not, proceed to step 4.

4. Rotate potentiometer R37 1/2 turn at a time and perform three-point linearity checks until the

0.1% of bandwidth is obtained. Rotations of less than 1/2 turn may be necessary when the adjustment is close.

c. Oscillator Symetry --

1. Using the distortion analyzer, monitor the emitter element of transistor Q13 on the VCO card.

2. Offset the oscillator frequency to the lower bandedge using the calibration setup in step (a) of this procedure.

3. Adjust potentiometer R56 for a minimum distortion indication.

4. Offset the oscillator frequency to upper bandedge.

5. Adjust potentiometer R60 for a minimum distortion indication.

6. Repeat this procedure until a minimum distortion indication is obtained.

d. Wave Shaper --

1. Using the distortion analyzer, monitor the appropriate front panel OUT test jack.

2. Remove the signal input to the VCO.

3. Adjust potentiometers R74 and R71 (in that order) alternately, until a minimum distortion indication is obtained.

## 5.4 DRAWINGS

The 4530 drawings are arranged in descending order starting with the top assembly diagram and continuing through all subassembly, schematic, and wiring diagrams. Table 5-3 lists the drawings, the order in which they appear in this manual, the EMR drawing numbers, and the page numbers.

Subassemblies and/or components of the assemblies on the assembly drawings are identified by reference numbers within the balloons. These numbers correspond to item numbers on the associated parts list in Section 6 of this manual. The assembly drawing and associated parts list are identified by the same number. For example, the subassemblies shown in the top assembly drawing, 14991, are listed by item number on PL-14991 in Section 6.

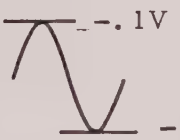
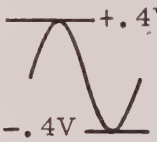
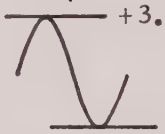
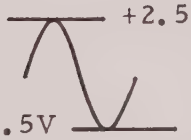
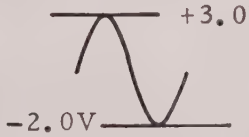
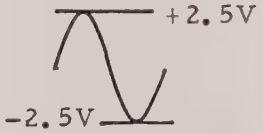
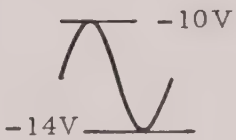
This parts list outlines the subassemblies by name and assembly drawings in which the subassemblies are illustrated. For example, item 2 on drawing 14991 is identified on PL-14991 as the front panel assembly which is illustrated independently on EMR drawing 14990. The parts on this assembly are listed on PL-14990. Subsequent assembly drawing and parts breakdown is performed in the same manner.

Certain assembly drawings illustrate more than one configuration of the assembly. When this is the case, dash (-) numbers are used following the assembly number to identify the configuration. An APPLICATION Chart in the lower center of the assembly drawing lists the configurations of the assembly and the particular units on which the assemblies are used. The dash numbers also identify the parts lists in Section 6 for the various configurations.

Table 5-1. Regulator Card Transistor Voltage Measurements (Ref. EMR Drawing 15797)

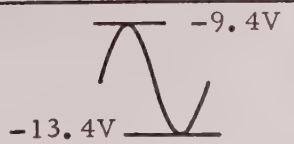
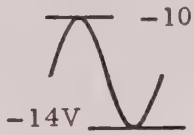
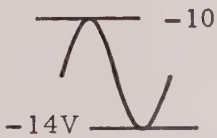
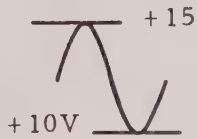
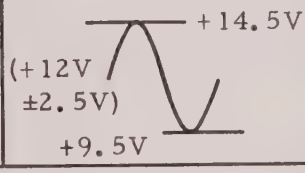
| COMPONENT | EMITTER | BASE | COLLECTOR |
|---|---|---|---|
| NOTE<br>Voltage levels provided are typical for one +18-volt regulator and one −18-volt regulator. Voltage levels at corresponding components in the remaining regulators are identical to those provided below. | | | |
| +18-VOLT REGULATOR | | | |
| Q1 | 2V P-P<br>DC LEVEL 37V DC | 36.2V DC | 18.6V DC |
| Q3 | 8.4V DC | 9V DC ±5% | 36.2V DC |
| Q4 | 8.4V DC | 9V DC | 18V DC |
| −18-VOLT REGULATOR | | | |
| Q5 | −8.4V DC | −9V DC ±5% | −36.2V DC |
| Q6 | −8.4V DC | −9V DC | −18V DC |
| Q7 | 2V P-P<br>DC LEVEL −37V DC | −36.2V DC | −18.6V DC |

Table 5-2. VCO Card Voltage Measurements and Waveforms (Ref. EMR Drawing 15794)

| COMPONENT | EMITTER | BASE | COLLECTOR |
|---|---|---|---|
| | NOTE<br>The following waveforms are based on an input of 10V peak-to-peak at a data frequency within the 4530 specifications. FREQ control set for center frequency and INPUT control set for full-bandwidth deviation. Deviation is ±40%. | | |
| Q1 | NA | SAME AS Q2 B | +12V DC |
| Q2 |  |  | +12V DC |
| Z1 | PIN 7  | | |
| Q3 |  | +2.5V DC | GRD |
| Q4 | SAME AS Q3 E | -2.5V DC | GRD |
| Q5* |  |  | -18V DC |
| Q6* | +6.6V DC | +6.0V DC |  |

* These voltage levels are based on using a ±40% deviation unit. Levels will decrease for units with lower deviations.

Table 5-2 (Cont'd.). VCO Card Voltage Measurements and Waveforms (Ref. EMR Drawing 15794)

| COMPONENT | EMITTER | BASE | COLLECTOR |
|---|---|---|---|
| Q22 |   |   | -18V DC |
| Q14 |   | SAME AS Q22 E | SUBCARRIER RATE |
| Q7 |   | (SEE BELOW) | (SEE BELOW) |
| Q15 | SAME AS Q14 E | SAME AS Q22 E |   |

NOTE

The following waveforms are based on no input signal to the VCO. Frequencies of the waveforms are at the subcarrier rate of the VCO.

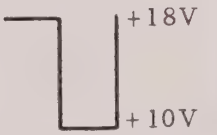
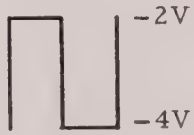
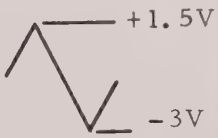
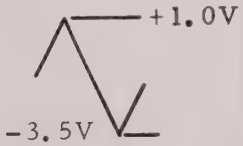
| | | | |
|---|---|---|---|
| Q8 | SAME AS Q14 C | -3.5V DC |   |
| Q9 | SAME AS Q14 C |   |   |
| Q7 | (See above--waveform is based on data input signal) | SAME AS Q15 C | SAME AS Q9 C |
| Q10 |   | SAME AS Q9 C | +18V DC |

Table 5-2 (Cont'd.). VCO Card Voltage Measurements and Waveforms (Ref. EMR Drawing 15794)

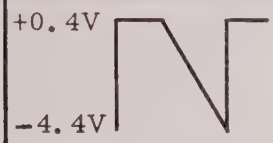
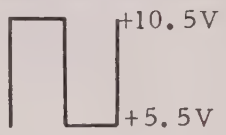
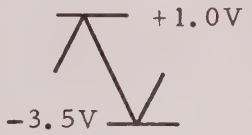
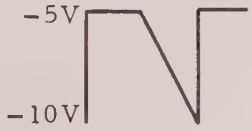
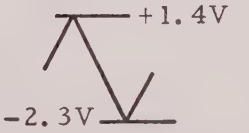
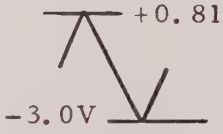
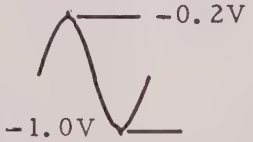
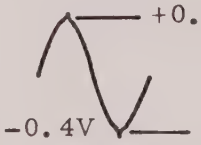
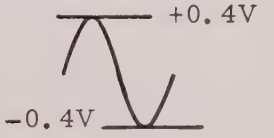
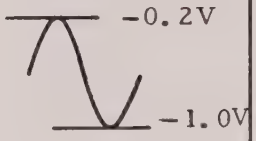
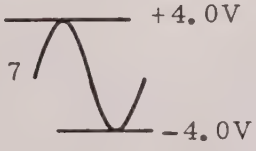
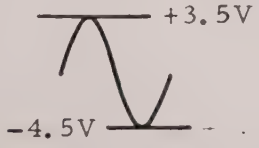
| COMPONENT | EMITTER | BASE | COLLECTOR |
|---|---|---|---|
| Q11 |   | SAME AS Q10 E |   |
| Q12 | SAME AS Q11 E | | |
| Q13 |   | SAME AS Q9 C | +18V DC |
| Q16 | -12.6V DC | -12V DC |   |
| Q24 | -12V DC | -11.4V DC | GRD |
| Q17 |   |   | -18V DC |
| Q18 |   |   | +18V DC |
| Q19 |   |   | -18V DC |
| Z2 |   | | |
| Q20 |   | SAME AS Z2-7 | +18V DC |

Table 5-2 (Cont'd.). VCO Card Voltage Measurements and Waveforms (Ref. EMR Drawing 15794)

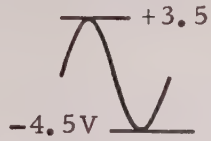
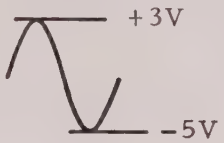
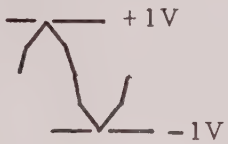
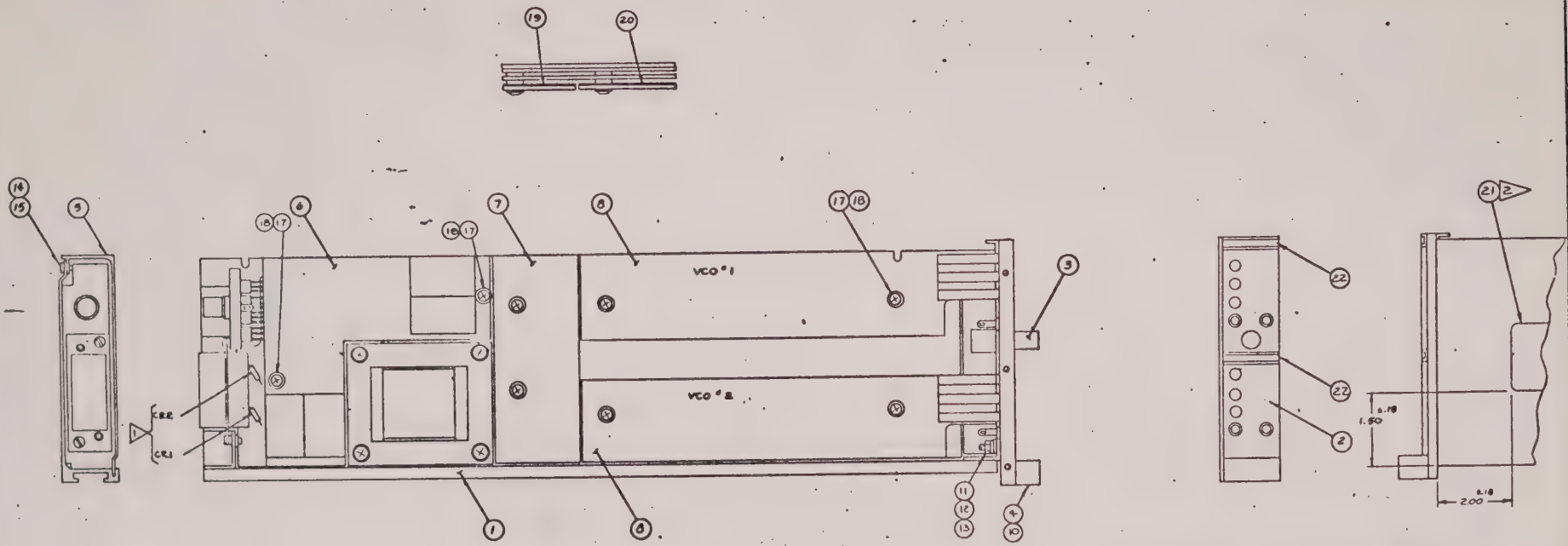
| COMPONENT | EMITTER | BASE | COLLECTOR |
|---|---|---|---|
| Q21 |  |  | -18V DC |
| JUNCTION OF CR12/CR14 |  | | |

Table 5-3. List of Drawings

| NAME | NUMBER | PAGE NO. |
|---|---|---|
| Model 4530 Dual VCO Oscillator Assembly | 14991 | 5-15 |
| Model 4530 Dual VCO Chassis Assembly | 14992 | 5-16 |
| Interconnection Printed-Wiring Assembly | 15908 | 5-17 |
| Front Panel Assembly | 14990 | 5-18 |
| Regulator Card Printed-Wiring Assembly | 15799 | 5-19 |
| Schematic | 15797 | 5-20 |
| Calibrate Card Printed-Wiring Assembly | 15906 | 5-21 |
| Schematic | 15800 | 5-22 |
| Schematic | 16131 | 5-23 |
| Schematic | 16130 | 5-24 |
| VCO Card Printed-Wiring Assembly | 15796 | 5-25 |
| Schematic | 15794 | 5-26 |
| Model 4530 System Schematic | 16135 | 5-27 |

| SYM | DESCRIPTION | | DATE | APPROVED |
|---|---|---|---|---|
| A | SEE ECO [illegible] | [illegible] | [illegible] | [illegible] |
| B | SEE [illegible] | [illegible] | [illegible] | [illegible] |
| C | MK ADDED 3-68-7 CONFIG 11-25-69 | WA | 11-25-69 | |
| D | ECO 39357 (1-28-70) ADDED ITEMS 19 & 20 | | 1-28-70 | |
| E | RK ADD VCO #1 & #2 IDENT. TO F10 | MA | 8-5-70 | |
| F | ECO 41180 ADD ITEM 20 & NOTE 2 | [illegible] | [illegible] | |
| G | ECO 42705 ADD ITEM 22 | 9-10-71 | 9-9-71 | |
| H | ECO [illegible] ADDED CAUTION (SEE FLAG NOTE) | [illegible] | 11-5-71 | |




NOTES:

1. INSTALL CR1 & CR2 PER WIRING SCHEMATIC 16185. SLEEVE LEADS USING ITEM E8 AR.
2. APPLY INFORMATION TO NAMEPLATE PER EMR 13406, CLASS B, TYPE 1B.

| REQUIRED | PART NO | DESCRIPTION | PART CLASS | MFG CODE | ITEM OR SYMBOL |
|---|---|---|---|---|---|
| | 184-89-00052 | FOR PARTS LIST SEE PL 19331-7 | | | |
| | 84-89-00052 | PL 19331-6 | | | |
| | 84-89-00051 | PL 19331-5 | | | |
| | [illegible] | PL 19331-4 | | | |
| | [illegible] | PL 19331-3 | | | |
| | [illegible] | PL 19331-2 | | | |
| | [illegible] | PL 19331-1 | | | |
| -7 -6 -5 -4 -3 -2 -1 BASIC | 06-86-00052 | FOR PARTS LIST SEE PL 14931 | | | |

LIST OF MATERIALS

| | | | |
|---|---|---|---|
| -7 | FINAL | 5530-03691 | |
| -6 | | VTM-EE | |
| -5 | | [illegible]-81 | |
| -4 | | [illegible] | |
| -3 | | [illegible] | |
| -2 | | [illegible] | |
| -1 | | [illegible] | |
| BSC | FINAL | 5530 | |

UNLESS OTHERWISE SPECIFIED

DO NOT SCALE DRAWING

APPLICATION

DO NOT APPLY PART NO. PER

LOCATE APPROX AS SHOWN

MATERIAL

TREATMENT OR FINISH

DRAWN: B. FAIRBROTHER 5/3/68

DESIGNER

CHECKED

DESIGN ENGINEER

PROJECT ENGINEER 9/9/68

APPROVED

APPROVED

EMR DIVISION OF EMHART INC. 1968
SARASOTA DIVISION • ELECTRO-MECHANICAL RESEARCH, INC. • SARASOTA, FLORIDA

# OSC, ASSEMBLY, DUAL VC MODEL 4530

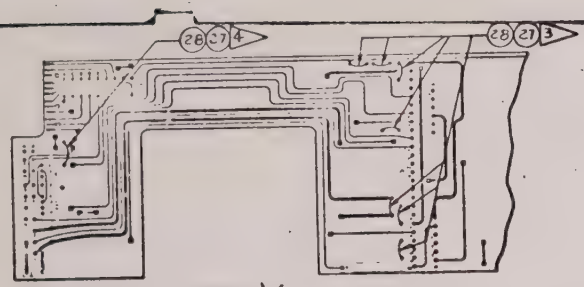
CODE IDENT NO 06141

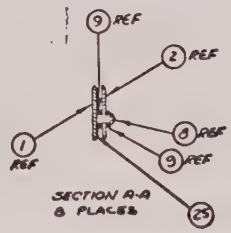
D 14991

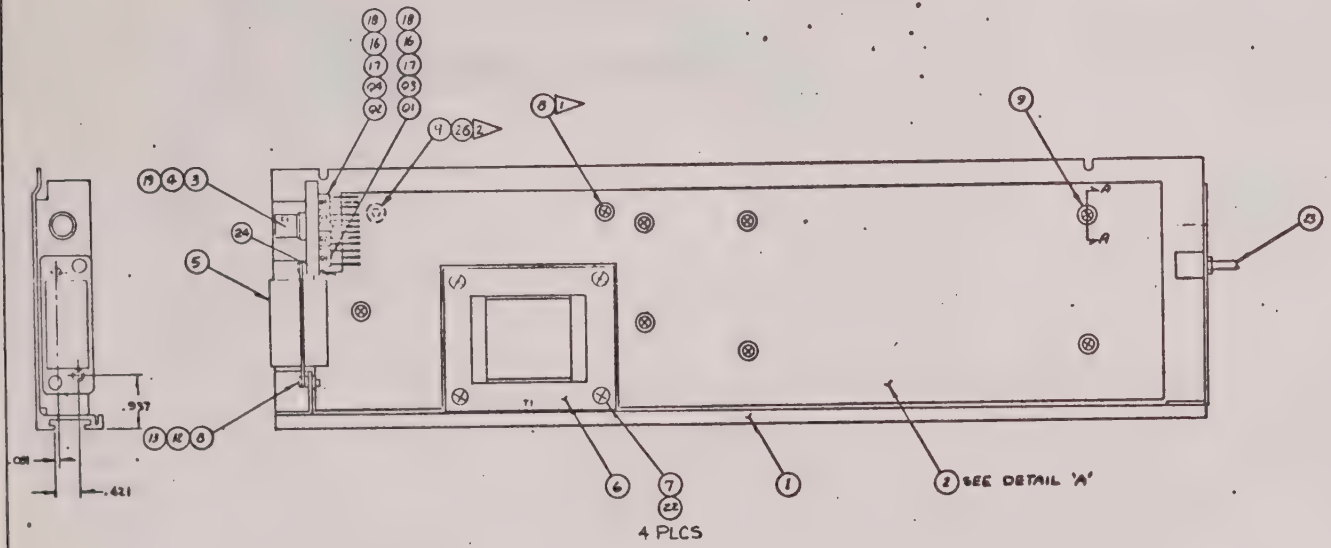
REV H

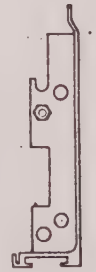
SCALE

184-89-00035 SHEET 1 OF 1



| BTR | REVISIONS | BY | DATE | APPROVED |
|---|---|---|---|---|
| a | SEE ECO 39352 | C.P. | 1-20-70 | |
| b | REC. CODED - CHG'G P/N | N/A | 1-20-70 | |
| C | PVC ADDED-2 CONFIG | 11-05-69 | N/A | 11-5-69 |
| D | ECO 39352 (1-20-70) ADDED ITEM 25 | | 1/14/70 | |
| E | ECO 41020 DELETE ITEMS 10 & 21, ITEM 9 | 1.52 (VP3/VP4) | | |
| F | ECO 41241 ADD DETAIL 'A' | 1 EA | 10-1-70 | |
| G | ECO 41368 CHG'G NOTE 2 | 1 EA VP | 10-16-70 | |
| H | ECO 42257 ITEM 28 WAS ITEM 26 | 1 EA VP | 2-2-71 | |
| J | ECO 48747 DELETE ITEM 20 | 1-28-74 | 4-15-74 | |

NOTES:

1. ITEM 8 TO BE REMOVED AT FINAL ASSEMBLY AND INSTALLED FOR CARD RETAINING.
2. INSTALL ITEM 9 APPROX WHERE SHOWN BETWEEN ITEM 25 & ITEM 2 USING ITEM 26 BOND ITEM 9 TO ITEM 25.
3. FOR MODEL 4530-9X INSTALL JUMPERS WHERE SHOWN.
4. FOR MODEL 4530-X4 INSTALL JUMPER FOR INT. CAL LOCAL CONTROL.

| REQUIRED | DWG SIZE | PART NO | DESCRIPTION | PART CLASS | MFG CODE | ITEM OR SYMBOL |
|---|---|---|---|---|---|---|
| | | 042-89-00151 | FOR PART LIST SEE PL 14992-2 | | | |
| | | 042-83-00018 | FOR PARTS LIST SEE PL 14-992-1 | | | |
| | | 042-83-00020 | FOR PARTS LIST SEE PL 14992 | | | |

LIST OF MATERIALS

| | | | |
|---|---|---|---|
| -2 | 19791-7 | 9530-93-890 | |
| -3 | 19791-6 | 9530-X5 | |
| -4 | 19791-5 | 9530-61 | |
| -5 | | 9530-X4 | |
| -1 | 6111-1 | 4020-2 | |
| ECO | 14971 | 9520 | |

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES
DECIMALS ANGLES FINISH
.XX ± .01 ±1°
.XXX ± .005
DO NOT SCALE DRAWING
MATERIAL
TREATMENT OR FINISH

DRAWN BY B. FAIRBROTHER 5-14-69
DESIGNER
CHECKED
DESIGN ENGINEER
PROJECT ENGINEER Tim S. Newlon 7/11/69
APPROVED
APPROVED

SARASOTA DIVISION © ESTR, INC. 1963
ELECTRO MECHANICAL RESEARCH, INC. • SARASOTA, FLORIDA

# CHASSIS ASSEMBLY MODEL 4530, DUAL VCO

| CAGE SHEET NO | SIZE | DWG NO | REV |
|---|---|---|---|
| 86141 | D | 14992 | J |
| SCALE 1:1 | 042-89-00090 | SHEET 1 OF 1 | |

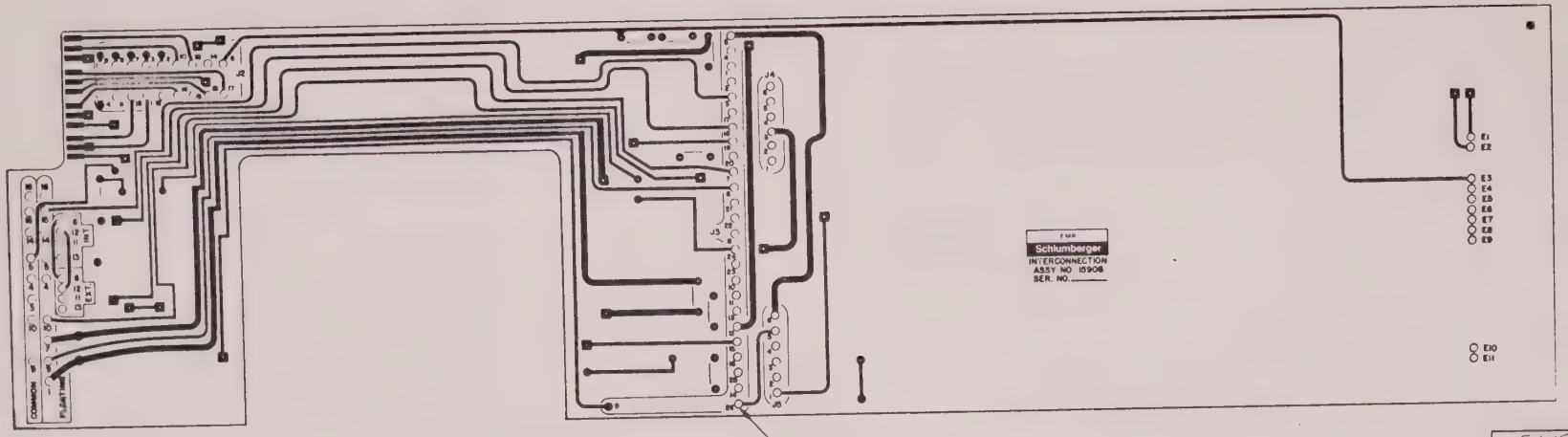
HOLE/COMPONENT CHART

DESCRIPTION/UNUSED NUMBER

ARTWORK REVISION INDEX

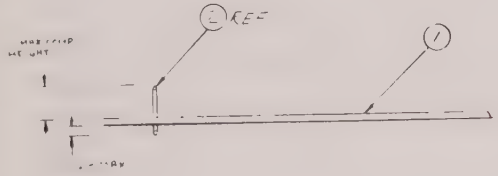
REVISIONS

| LTR | DESCRIPTION | EFFECTIVE TO | DATE | APPROVED |
|---|---|---|---|---|
| C | ECO 4413 REVISED CRT | | 11/1- | |




15908

(2) TYP (57 PLACES)




PARTS LIST

UNLESS OTHERWISE SPECIFIED

| | | |
|---|---|---|
| DRAWN BY | C. J. [illegible] | 4/1/83 |
| REVISED | [illegible] | [illegible] |
| CHECKED | [illegible] | |
| DESIGN ENGINEER | [illegible] | |
| PROJECT ENGINEER | [illegible] | [illegible] |

DO NOT SCALE DRAWING

MATERIAL

APPROVED

APPROVED

EMR TELEMETRY | A DIVISION OF SCHLUMBERGER

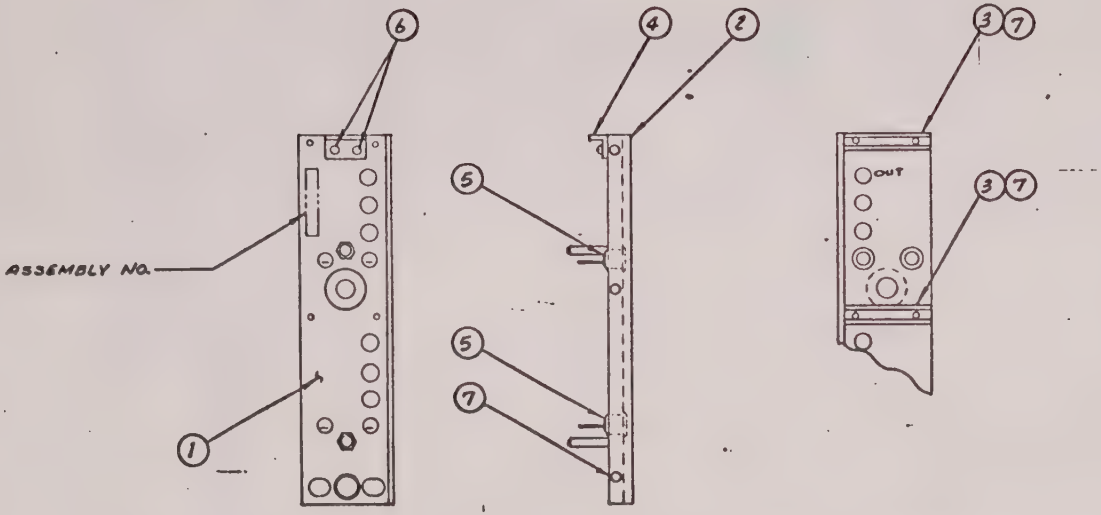
PRINTED WIRING ASSEMBLY
INTERCONNECTION

| SIZE | CODE IDENT NO | DRAWING NO | REV |
|---|---|---|---|
| D | 06141 | 15908 | C |

SCALE 1:1 | [illegible] | SHEET 1 OF 1

| REVISION INDEX | | | | | | |
|---|---|---|---|---|---|---|
| SHEET NO | 1 | | | | | |
| REVISION | A | | | | | |

| REVISIONS | | | | | |
|---|---|---|---|---|---|
| SYM | DESCRIPTION | SERIAL EFFECTIVE | DATE | APPROVED | |
| A | ECO 07744 REVISED PANEL MARKING 36° WAS 30° AROUND SWITCH. | 8696UP | 7-17-73 | | |




14990

NOTES:
1. PAINT AND LETTER PER POA.

THIS LIM FOR REF. ONLY FOR P/L SEE EOP P/L 14990.

| | | REF | C | PART NO. | DESCRIPTION | PART CLASS | MFG CODE | ITEM OR SYMBOL |
|---|---|---|---|---|---|---|---|---|
| | | | | MIL-14990 | MARKING | | | 8 |
| | | 7 | | 229-02-00216 | SCREW | | | 7 |
| | | 2 | | 229-02-00217 | SCREW | | | 6 |
| | | 4 | | 143-XX-XXXXX | JACK | | | 5 |
| | | 1 | C | 6012 | BRKT, LOCATING | | | 4 |
| | | 2 | G | 15719 | IDENT, RETAINER | | | 3 |
| | | 1 | | 14993 | STRIP | | | 2 |
| | | 1 | C | 15717 | PNL ASSY. FRONT | | | 1 |
| -2 | -1 | BASIC | LWD & ZL | PART NO. | DESCRIPTION | PART CLASS | MFG CODE | ITEM OR SYMBOL |
| REQUIRED | | | | | | | | |

LIST OF MATERIALS

| | | |
|---|---|---|
| BSC | 14991 | 4530 |
| DASH NO | NEXT ASSY NO | USED ON |

APPLICATION
DO NOT APPLY PART NO. PER
EMR 13406 CL-A, TYPE I
LOCATE APPROX AS SHOWN

UNLESS OTHERWISE SPECIFIED
TOLERANCES
DECIMALS ANGLES SURFACE FINISH
.X = ±.030 ±2°
.XX = ±.010
ALL DIMENSIONS ARE IN INCHES
THREADS CLASS 2A OR 2B PER MIL-S-7742
REMOVE BURRS AND BREAK SHARP EDGE
HOLE TOLERANCES PER SAE STANDARDS
DIMENSIONS INCLUDE APPLIED FINISH
SAE WORKMANSHIP STANDARDS APPLY
DO NOT SCALE DRAWING

MATERIAL

TREATMENT OR FINISH

| | NAME | DATE |
|---|---|---|
| DRAWN BY | B. FAIRBROTHER | 5-20-68 |
| DESIGNED | | 6-6-68 |
| CHECKED | | 6-6-68 |
| DESIGN ENGINEER | | |
| PROJECT ENGINEER | Thos S. Nadeau | 6/13/68 |
| APPROVED | | |
| APPROVED | | |

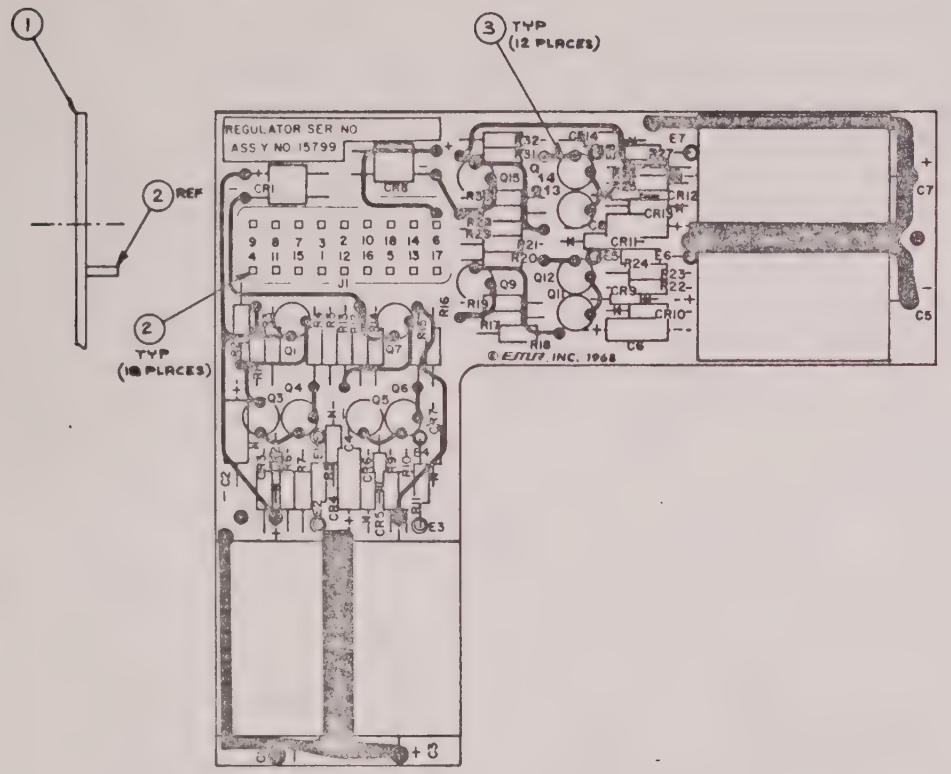
..2 INC. 1968
SARASOTA DIVISION
ELECTRO-MECHANICAL RESEARCH, INC. • SARASOTA, FLORIDA

ASSEMBLY
PANEL, FRONT

EDC

| CODE IDENT NO. | SIZE | | REV |
|---|---|---|---|
| 06141 | C | 14990 | A |
| SCALE 1/1 | 191-89-00246 | SHEET 1 | OF 1 |

| REVISIONS | | | | |
|---|---|---|---|---|
| SYM | DESCRIPTION | SERIAL EFFECTIVE | DATE | APPROVED |




| QTY REQUIRED | | | PART NO. | DESCRIPTION | PART CLASS | MFG CODE | ITEM OR SYMBOL |
|---|---|---|---|---|---|---|---|
| | | A | 205-89-00494 | FOR PARTS LIST SEE P/L 15799 | | | |
| -2 | 1 | BASIC | OWG SIZE | | | | |

LIST OF MATERIALS

| DASH NO | NEXT ASSY NO | USED ON |
|---|---|---|
| BSC | 14991 | 4530 |

APPLICATION

DO NOT APPLY PART NO PER

LOCATE APPROX AS SHOWN

UNLESS OTHERWISE SPECIFIED

TOLERANCES — DECIMALS — ANGLES — SURFACE FINISH

DO NOT SCALE DRAWING

MATERIAL

TREATMENT OR FINISH

DRAWN BY C.P.B. Ogle 3/5/68

DESIGNED D.L. Bowles 3/6/68

CHECKED

DESIGN ENGINEER

PROJECT ENGINEER John S. Norton 3/5/68

APPROVED

APPROVED

EMR SARASOTA DIVISION © EMR, INC. 1968
ELECTRO-MECHANICAL RESEARCH, INC. • SARASOTA, FLORIDA

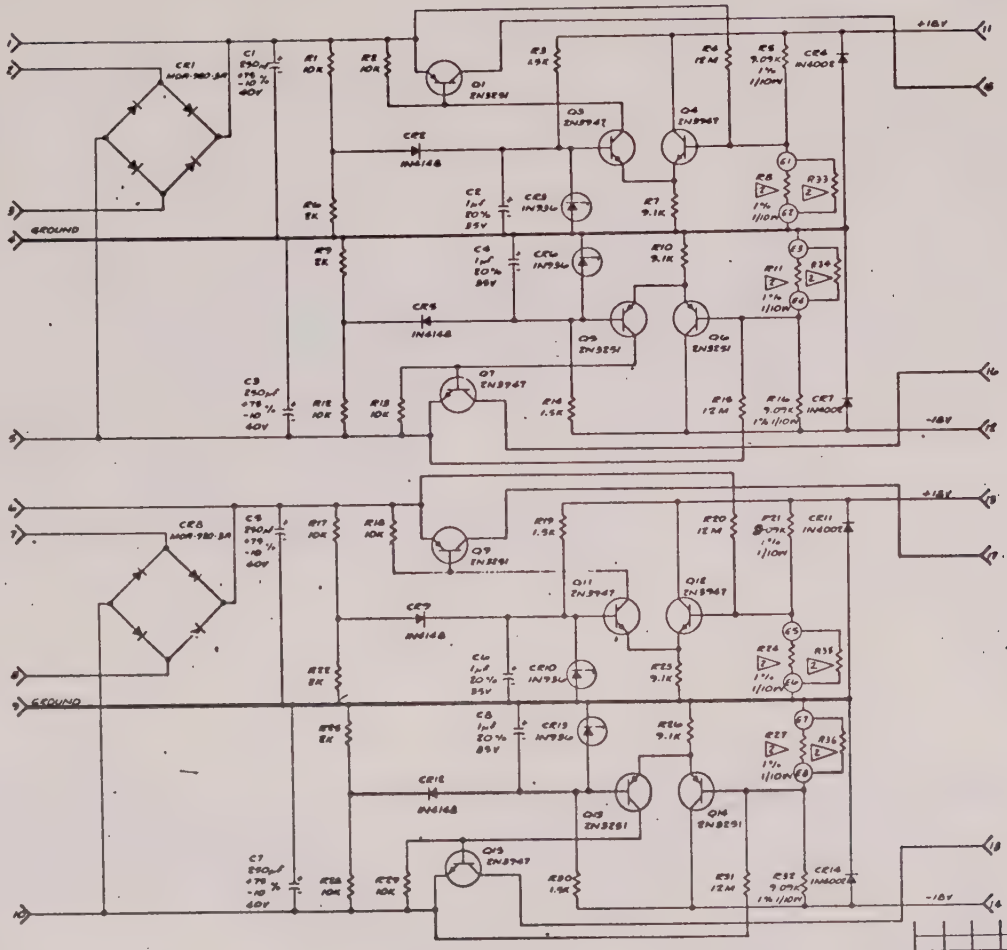
# PRINTED-WIRING ASSEMBLY REGULATOR

EDC

| CODE IDENT NO | SIZE | | REV |
|---|---|---|---|
| 06141 | C | 15799 | |
| SCALE 2/1 | 205-89-00494 | SHEET 1 OF 1 | |

15799 1

EMR 3 2 174 OZALID




NOTES:

1. ALL RESISTOR VALUES ARE IN OHMS (K=1000 X M=1,000,000) AND ARE 5% 1/4W UNLESS NOTED
2. ▷ TEST POINTABLE

| REV | DESCRIPTION | DATE | APPROVED |
|---|---|---|---|
| A | ECO 33107 (7-21-67) | 7-21-67 | |

LIST OF MATERIALS

| REQ'D | PART NO. | DESCRIPTION |
|---|---|---|

| | |
|---|---|
| Q16 | |
| Q14 | |
| Q13 | |
| CR14 | |
| C8 | |
| NO LIST USED | NO NOT USED |
| COMPONENT CHART | |

| | | | |
|---|---|---|---|
| | | 15799 | 6530 |

DO NOT SCALE DRAWING

| | |
|---|---|
| DRAWN BY | William Soltz 6-7-68 |
| CHECKED | William Soltz 6-7-68 |
| DESIGN ENGINEER | |
| PROJECT ENGINEER | 7-21-67 |
| APPROVED | |
| APPROVED | |

MATERIAL: X

TREATMENT OR FINISH: X

APPLICATION

DO NOT APPLY PART NO PER

LOCATE APPROX AS SHOWN

© EMUF, INC. 1968

LAWRENCE DIVISION
ELECTRO MECHANICAL RESEARCH INC. • MARBORO, FLORIDA

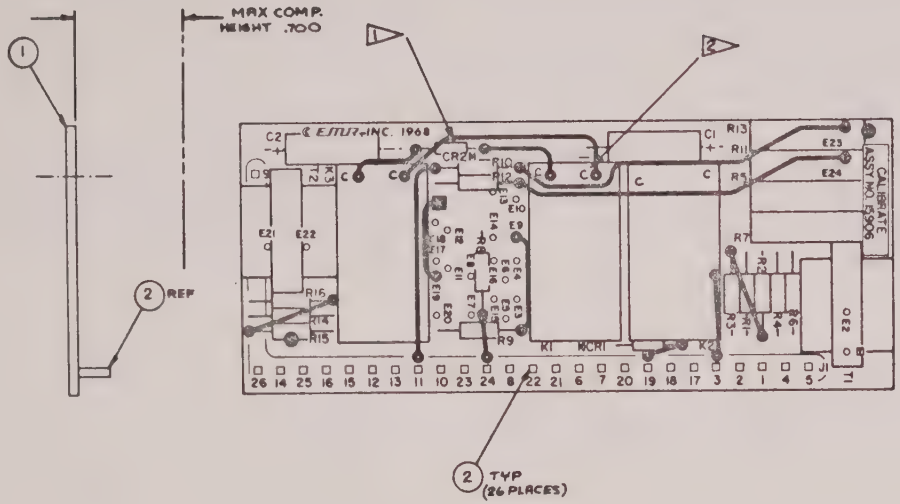
PRINTED-WIRING SCHEMATIC

"REGULATOR"

| CODE IDENT NO | SIZE | DWG NO | REV |
|---|---|---|---|
| 06141 | D | 15797 | A |

SCALE: NONE | 405-01-00375 | SHEET 1 OF

| REVISIONS | | | | |
|---|---|---|---|---|
| SYM | DESCRIPTION | SERIAL EFFECTIVE | DATE | APPROVED |




| CONFIG | JUMPERS (ITEM 3 AND 4) |
|---|---|
| 15906 | E3-E4, E5-E6, E7-E8, E19-E20 |
| 15906-1 | E9-E10, E23-E24, E11-E12, E15-E16 |
| 15906-2 | E9-E10, E23-E24, E11-E12, E15-E16, E21-E22 |
| 15906-3 | E7-E8, E19-E20, E17-E18, E13-E14 |
| 15906-4 | E7-E8, E19-E20, E17-E18, E13-E14, E1-E2, E21-E22 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | A | 205-09-00499 | FOR PARTS LIST SEE P/L - 15906-4 | | | |
| | | | | | A | 205-09-00498 | FOR PARTS LIST SEE P/L - 15906-3 | | | |
| | | | | | A | 205-09-00497 | FOR PARTS LIST SEE P/L - 15906-2 | | | |
| | | | | | A | 205-09-00496 | FOR PARTS LIST SEE P/L - 15906-1 | | | |
| | | | | | A | 205-09-00495 | FOR PARTS LIST SEE P/L 15906 | | | |
| -4 | -3 | 2 | 1 | BASIC | DWG SIZE | PART NO | DESCRIPTION | PART CLASS | MFG CODE | ITEM OR SYMBOL |
| REQUIRED | | | | | | LIST OF MATERIALS | | | | |

NOTES:

1. INSTALL JUMPER IN PLACE OF CR2 ON -1 & -2 CONFIGURATIONS.
2. C- DENOTES COIL END OF RELAY.

| | | |
|---|---|---|
| -4 | 41991 | 4530 |
| -3 | 41991 | 4530 |
| -2 | 41991 | 4530 |
| -1 | 41991 | 4530 |
| BSC | 41991 | 4530 |
| DASH NO | NEXT ASSY NO | USED ON |

APPLICATION

DO NOT APPLY PART NO PER

LOCATE APPROX AS SHOWN

UNLESS OTHERWISE SPECIFIED

DO NOT SCALE DRAWING

MATERIAL

TREATMENT OR FINISH

| | | DATE |
|---|---|---|
| DRAWN BY | | 8-2-68 |
| DESIGNER | | 7-26-68 |
| CHECKER | | 8-14-68 |
| DESIGN ENGINEER | | |
| PROJECT ENGINEER | W. S. Norton | 9/5/68 |
| APPROVED | | |
| APPROVED | | |

SARASOTA DIVISION ©1968 ELECTRO-MECHANICAL RESEARCH, INC. • SARASOTA, FLORIDA

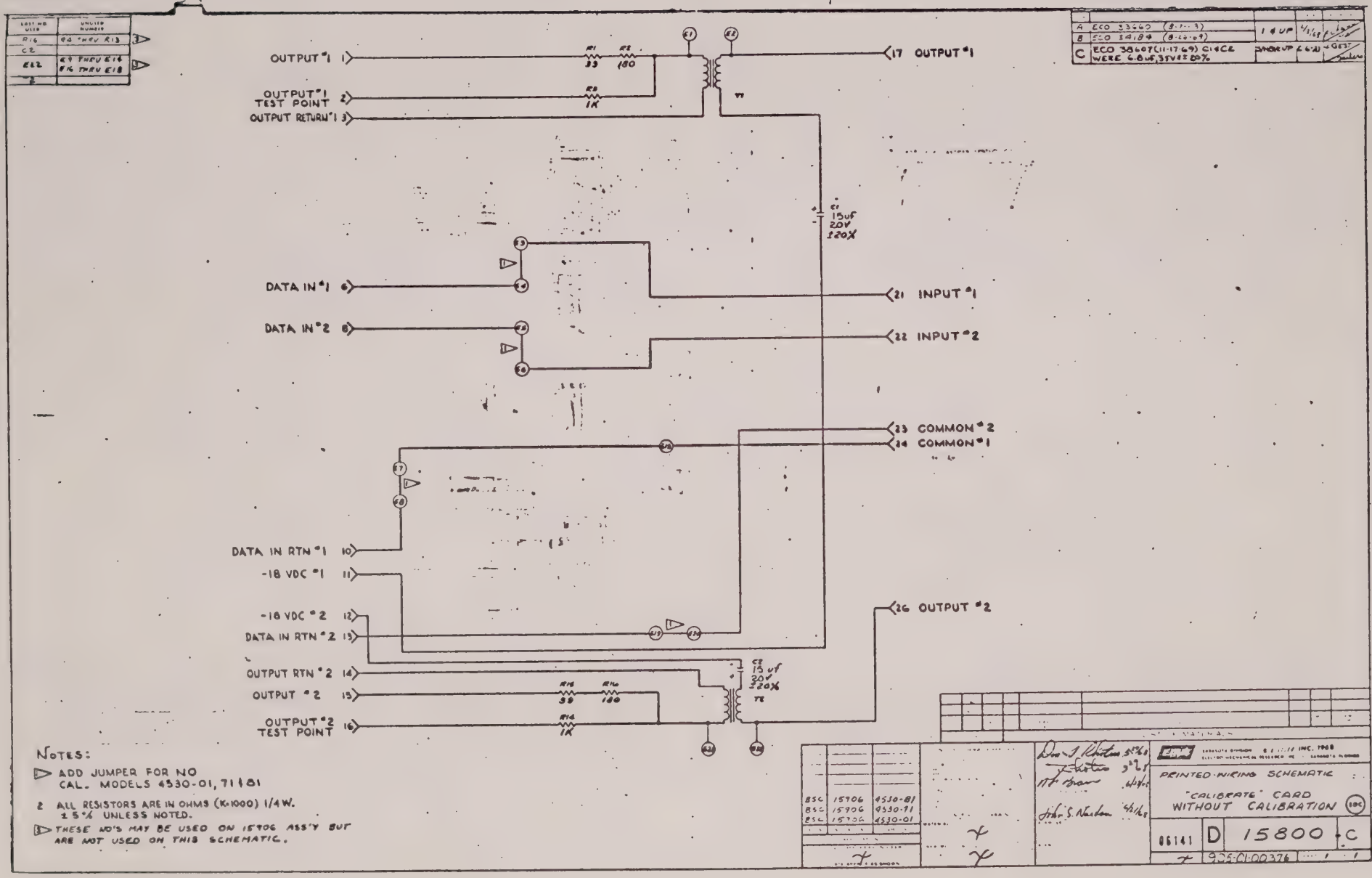
# PRINTED-WIRING ASSEMBLY CALIBRATE

EDC

| CODE IDENT NO | SIZE | | REV |
|---|---|---|---|
| 06141 | C | 15906 | |
| SCALE 2/1 | 205-09-00495 | SHEET 1 OF 1 | |

1 15906

EMR 3 2 174 OZALID

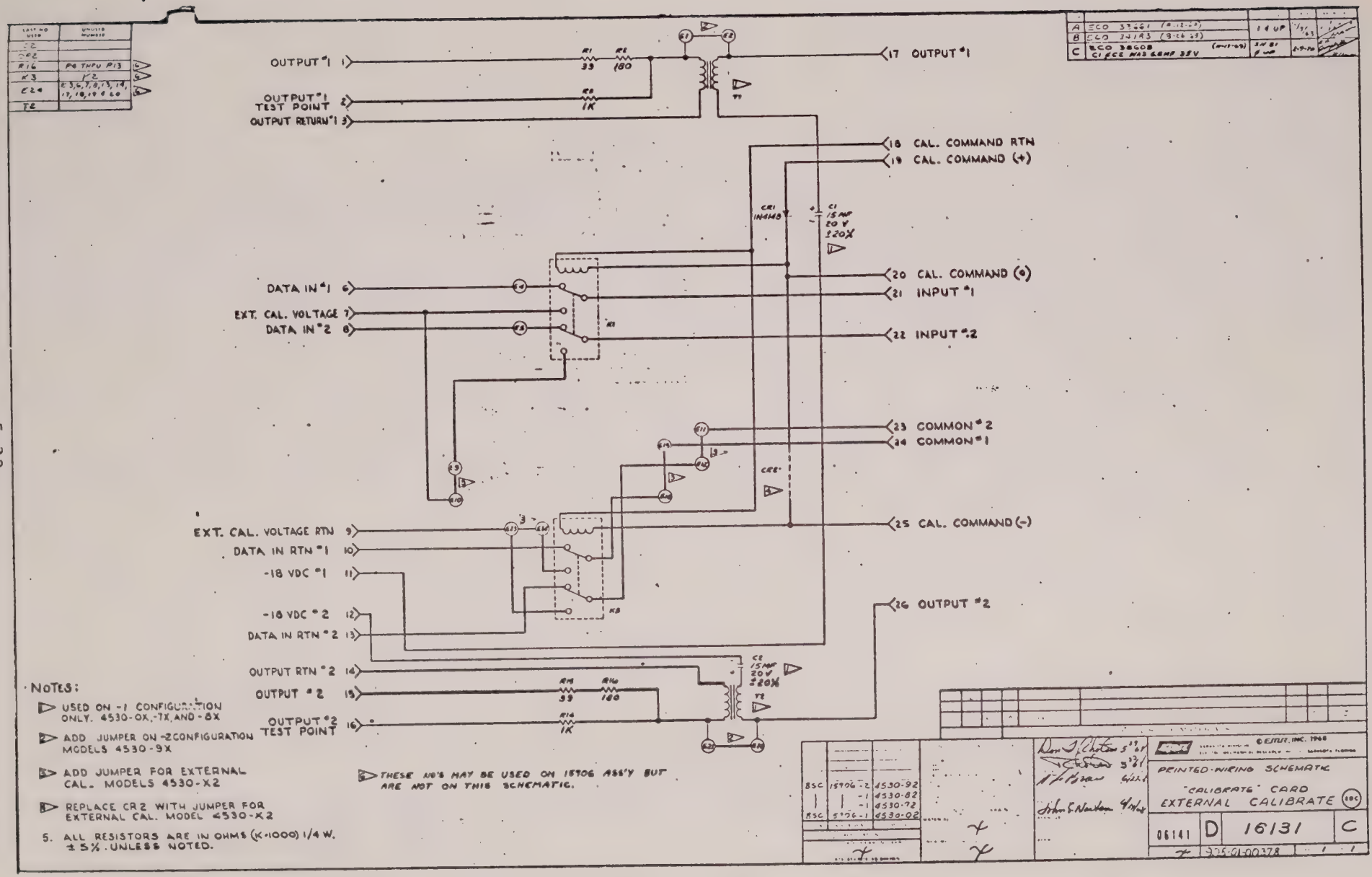



NOTES:

△ ADD JUMPER FOR NO CAL. MODELS 4530-01, 71 & 81

2 ALL RESISTORS ARE IN OHMS (K=1000) 1/4W. ±5% UNLESS NOTED.

△ THESE NO'S MAY BE USED ON 15706 ASS'Y BUT ARE NOT USED ON THIS SCHEMATIC.




| LAST NO USED | UNUSED NUMBER |
|---|---|
| C2 | |
| CR2 | |
| R16 | R6 THRU R13 |
| K3 | K2 |
| C24 | E3,5,7,8,13,14, 17,18,19 & 20 |
| T2 | |

| | | | |
|---|---|---|---|
| A | ECO 33961 (8-12-68) | 1 & UP | 7/1/69 |
| B | ECO 34183 (9-26-69) | 3 & UP | |
| C | ECO 38608 C1 FCE N33 60MF 35V (4-11-69) | 1 UP | 4-9-70 |

NOTES:

1. △ USED ON -1 CONFIGURATION ONLY. 4530-0X, -1X, AND -8X
2. ▷ ADD JUMPER ON -2 CONFIGURATION MODELS 4530-9X
3. ▷ ADD JUMPER FOR EXTERNAL CAL. MODELS 4530-X2
4. ▷ REPLACE CR2 WITH JUMPER FOR EXTERNAL CAL. MODEL 4530-X2
5. ALL RESISTORS ARE IN OHMS (K=1000) 1/4 W. ±5% UNLESS NOTED.

▷ THESE NO'S MAY BE USED ON 15706 ASS'Y BUT ARE NOT ON THIS SCHEMATIC.

| | | |
|---|---|---|
| BSC | 15906-2 | 4530-92 |
| | -1 | 4530-82 |
| | -1 | 4530-72 |
| BSC | 5776-1 | 4530-02 |

© EMR, INC. 1968

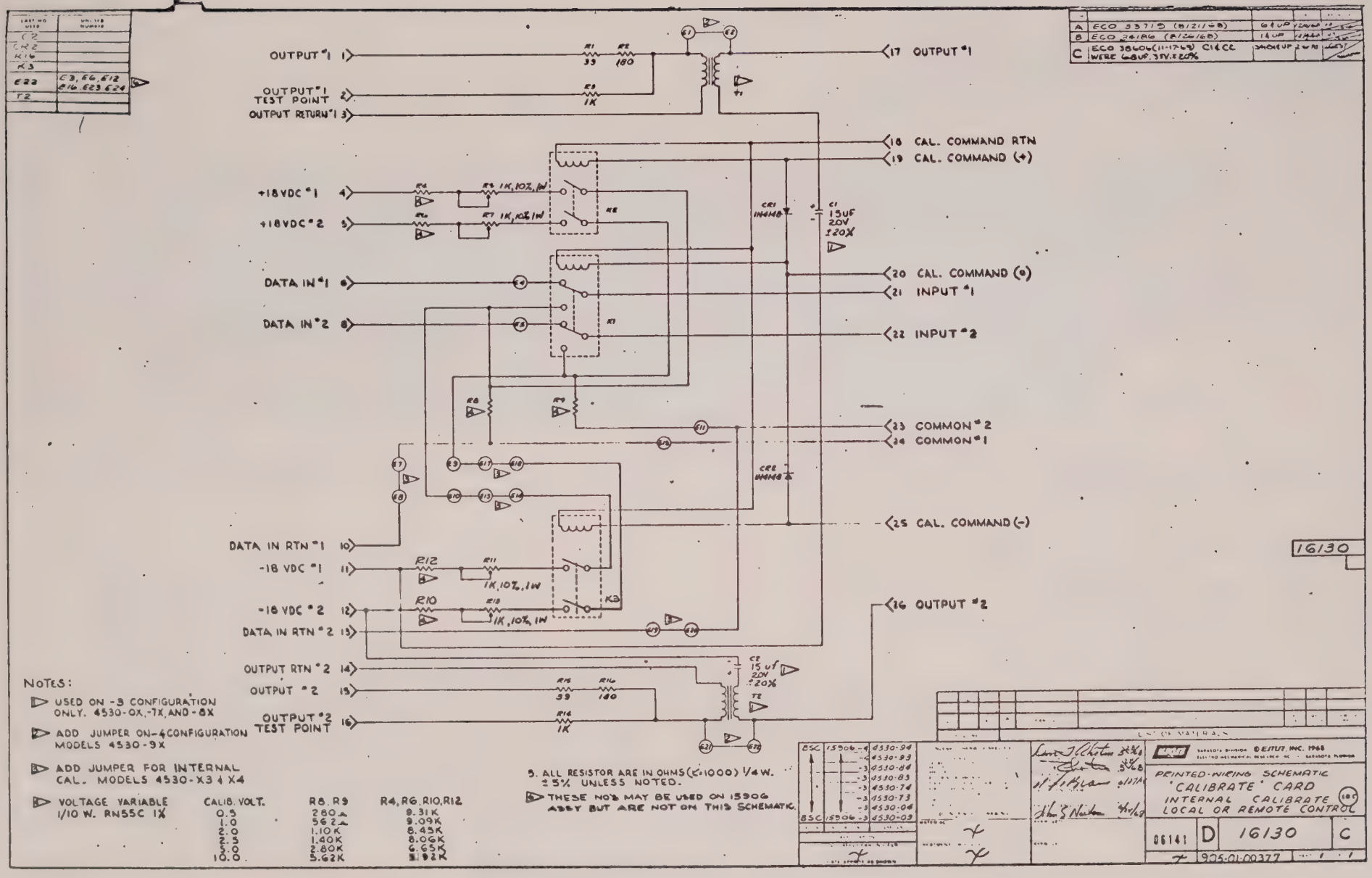
PRINTED-WIRING SCHEMATIC

"CALIBRATE" CARD

EXTERNAL CALIBRATE

06141 D 16131 C

975-01-00378




| | | | | |
|---|---|---|---|---|
| - | | | | |
| A | ECO 33715 (8/21/68) | G & UP | | |
| B | ECO 34186 (9/26/68) | 1 & UP | | |
| C | ECO 38606(11-17-69) WERE G&UP, STY. ±20% | 340 & UP | 2 & UP | |

| LAST NO USED | UNUSED NUMBERS |
|---|---|
| K2 | |
| K16 | |
| K3 | |
| E22 | E3, E6, E12, E16, E23, E24 |
| T2 | |

NOTES:

1. ▷ USED ON -3 CONFIGURATION ONLY. 4530-0X, -7X, AND -8X
2. ▷ ADD JUMPER ON-4 CONFIGURATION MODELS 4530-9X
3. ▷ ADD JUMPER FOR INTERNAL CAL. MODELS 4530-X3 & X4
4. ▷ VOLTAGE VARIABLE 1/10 W. RN55C 1%

| CALIB. VOLT. | R8, R9 | R4, R6, R10, R12 |
|---|---|---|
| 0.5 | 280Ω | 9.31K |
| 1.0 | 562Ω | 9.09K |
| 2.0 | 1.10K | 8.45K |
| 2.5 | 1.40K | 8.06K |
| 5.0 | 2.80K | 6.65K |
| 10.0 | 5.62K | 3.92K |

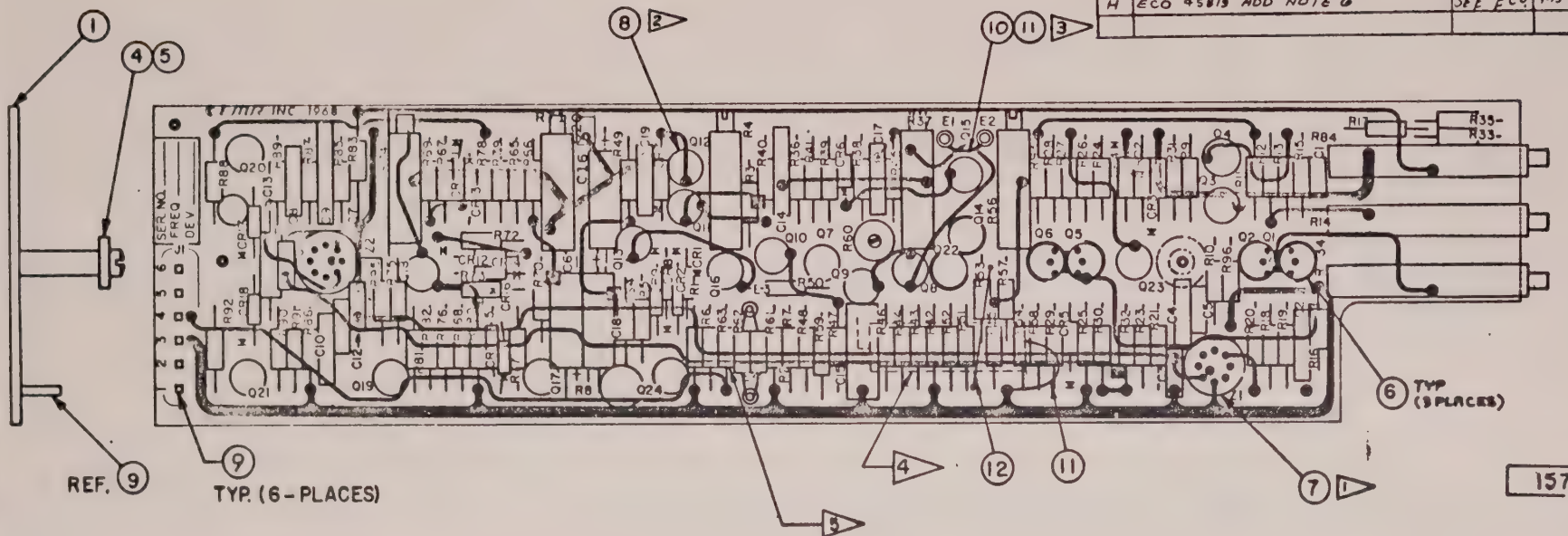
5. ALL RESISTOR ARE IN OHMS (K=1000) 1/4 W. ±5% UNLESS NOTED.
6. ▷ THESE NO'S MAY BE USED ON 15306 ASSY BUT ARE NOT ON THIS SCHEMATIC.

| | | |
|---|---|---|
| BSC 15306 -4 | 4530-94 | |
| -4 | 4530-93 | |
| -3 | 4530-84 | |
| -3 | 4530-83 | |
| -3 | 4530-74 | |
| -3 | 4530-73 | |
| -3 | 4530-04 | |
| BSC 15306 -3 | 4530-03 | |

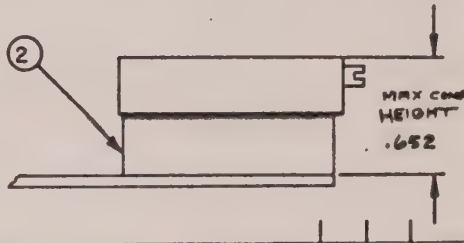
| | | | |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | |

| | | | | |
|---|---|---|---|---|
| J | ECO 30790 INTERIM | | 10-31-74 | |
| K | ECO 30793 ADDED C20 | | 11-4-74 | |

| | | | | |
|---|---|---|---|---|
| A | ECO S/N 33693 (INTERM 11-5-69) | SEE ECO | 11-5-69 | |
| B | ECO S/N 35226 (11-5-69) | SEE ECO | | |
| C | ECO 35915 (1-27-69) INTERIM | SEE ECO | 6-12-69 | |
| D | ECO 36530 (3-27-69) | 1 UP | 6-12-69 | |
| E | ECO 38233 (10-6-69) ADDED NOTE 4, ITEMS 11 & 12 AT NOTE 3 IN F/D | 14 UP | 2-11-70 | |
| F | RCD CHNG ADD ARROW AT C12 | N/A | 4-19-71 | |
| G | ECO 44489 ADD 5 IN F/D NOTES | 3-26-72 | 3-17-72 | |
| H | ECO 45819 ADD NOTE 6 | SEE ECO | 9-15-72 | |




15796




NOTES:

1. FOR USE WITH Z1 AND Z2.
2. FOR USE WITH ALL TRANSISTORS.
3. JUMPER MAY BE REMOVED FOR UNITS ABOVE 50 KHz.
4. DASHED OUTLINE IS ALTERNATE POSITION FOR C15 WHEN THE CASE SIZE WILL NOT PERMIT MOUNTING IN STD POSITION. USE ITEMS 11 & 12 AS REQ'D.
5. R63 IS NON STD SPACING AND MUST BE SPACED .062 MIN. OFF PWB. USE HELICAL LEAD BENDS.
6. ALL COMPONENTS SHALL BE INSTALLED AND THE PWA SHALL BE AGED IN ACCORDANCE WITH DRAWING 11243. IN CASE OF COMPONENT FAILURE, ONLY THE FOLLOWING COMPONENTS MUST BE REPLACED WITH PARTS AGED ACCORDING TO DWG 11243; Q5, 6, 7, 8, 9, 14, 15, 22, 24, CR1, 2, 8, 9 & C15.

| REQUIRED -2 | REQUIRED -1 | BASIC | DWG SIZE | PART NO. | DESCRIPTION | PART CLASS | MFG CODE | ITEM OR SYMBOL |
|---|---|---|---|---|---|---|---|---|
| | | X | A | 205-89-00406 | FOR PARTS LIST SEE P/L 15796 | | | |

LIST OF MATERIALS

| | | |
|---|---|---|
| BSC | 14991 | 4530 |
| DASH NO | NEXT ASST NO | USED ON |

APPLICATION

DO NOT APPLY PART NO PER

LOCATE APPROX AS SHOWN

UNLESS OTHERWISE SPECIFIED
TOLERANCES: DECIMALS XX = ± .03, XXX = ± .010; ANGLES ± 1/2°; SURFACE FINISH 125
ALL DIMENSIONS ARE IN INCHES
THREADS CLASS 2A OR 2B PER MIL-S 7742
REMOVE BURRS AND BREAK EDGES .010 MAX
HOLE TOLERANCES PER EMR SPEC 3370
DIMENSIONS INCLUDE APPLIED FINISH
EMR WORKMANSHIP STANDARDS APPLY
DO NOT SCALE DRAWING

MATERIAL

TREATMENT OR FINISH

| | | |
|---|---|---|
| DRAWN BY | Jim Graham | DATE 9-12-68 |
| DESIGNER | | 9-12-68 |
| CHECKED | | 9-12-68 |
| DESIGN ENGINEER | | |
| PROJECT ENGINEER | John S. Nardone | 9/13/68 |

APPROVED

APPROVED

EMR SARASOTA DIVISION ©1968 ELECTRO-MECHANICAL RESEARCH, INC. • SARASOTA, FLORIDA

# PRINTED-WIRING ASSEMBLY
## VCO

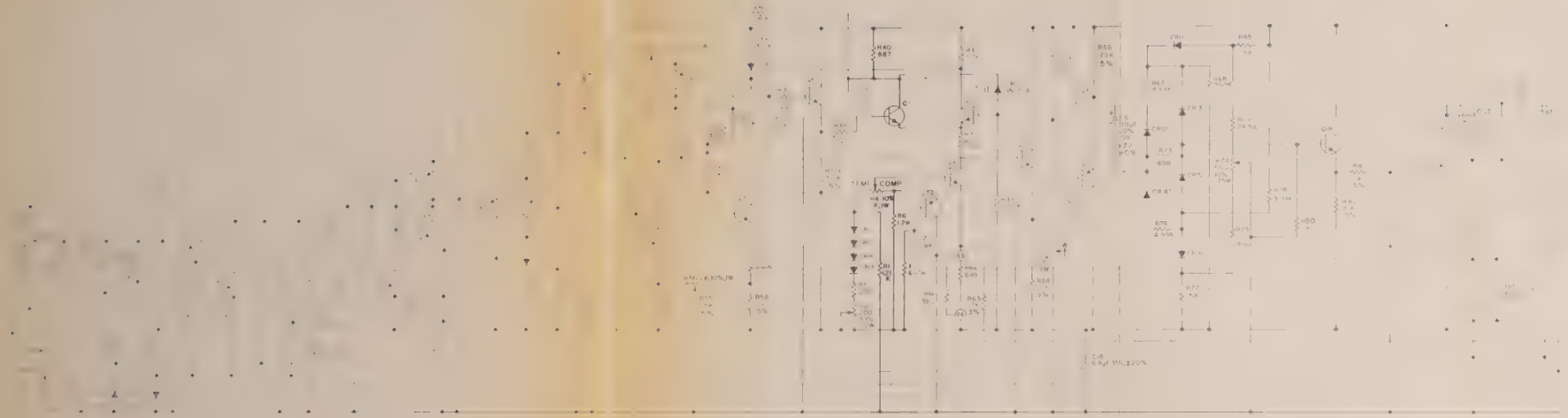
EDC

| CODE IDENT NO. | SIZE | | REV |
|---|---|---|---|
| 06141 | C | 15796 | K |
| SCALE 2/1 | 205-89-00406 | SHEET 1 OF 1 | |

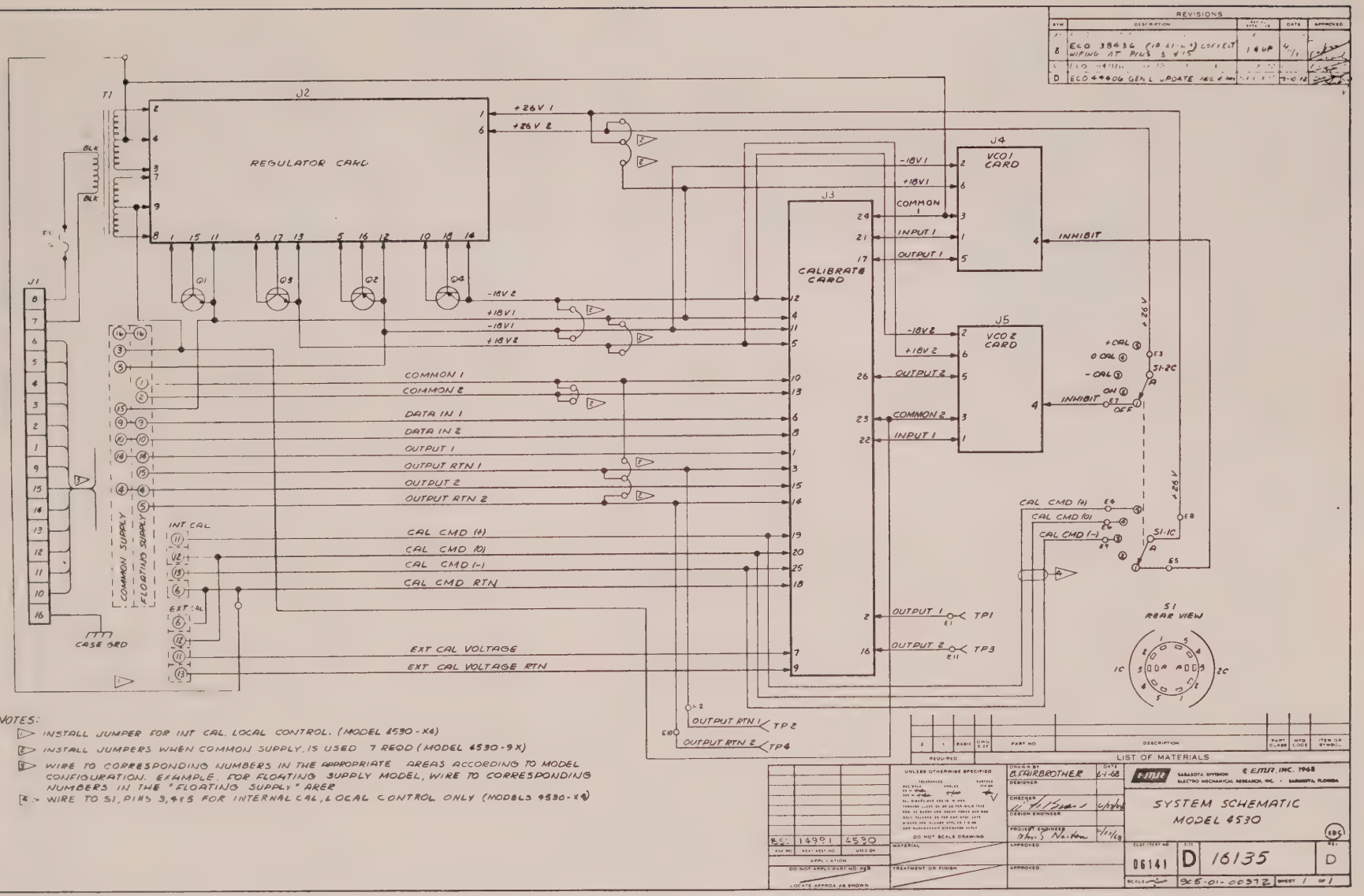
EMR 3 2 174 OZALID

5-25

15796




PRINTED-WIRING SCHE
VCO


REVISIONS
B ECO 38436 (10 61 in) CORRECT WIRING AT PINS 5 & 15 1 6 UP 4/13
D ECO 44606 GEN L UPDATE 16 UP 9-10-12
T1
J2
REGULATOR CARD
+26V 1
+26V 2
J1
Q1
Q3
Q2
Q4
-18V 2
+18V 1
-18V 1
+18V 2
J3
CALIBRATE CARD
J4
VCO1 CARD
J5
VCO 2 CARD
-18V 1
+18V 1
COMMON 1
INPUT 1
OUTPUT 1
INHIBIT
-18V 2
+18V 2
OUTPUT 2
COMMON 2
INPUT 1
INHIBIT
+26 V
+CAL
0 CAL
-CAL
S1-2C
ON
OFF
COMMON 1
COMMON 2
DATA IN 1
DATA IN 2
OUTPUT 1
OUTPUT RTN 1
OUTPUT 2
OUTPUT RTN 2
INT CAL
CAL CMD (+)
CAL CMD (0)
CAL CMD (-)
CAL CMD RTN
EXT CAL
EXT CAL VOLTAGE
EXT CAL VOLTAGE RTN
COMMON SUPPLY
FLOATING SUPPLY
CASE GRD
CAL CMD (+)
CAL CMD (0)
CAL CMD (-)
S1-1C
OUTPUT 1 TP1
OUTPUT 2 TP3
OUTPUT RTN 1 TP2
OUTPUT RTN 2 TP4
S1 REAR VIEW
NOTES:
1. INSTALL JUMPER FOR INT CAL, LOCAL CONTROL. (MODEL 6530-X4)
2. INSTALL JUMPERS WHEN COMMON SUPPLY IS USED IF REQD (MODEL 6530-9X)
3. WIRE TO CORRESPONDING NUMBERS IN THE APPROPRIATE AREAS ACCORDING TO MODEL CONFIGURATION. EXAMPLE: FOR FLOATING SUPPLY MODEL, WIRE TO CORRESPONDING NUMBERS IN THE "FLOATING SUPPLY" AREA
4. WIRE TO S1, PINS 3, 4 & 5 FOR INTERNAL CAL, LOCAL CONTROL ONLY (MODELS 6530-X4)
LIST OF MATERIALS
B.C. 14991 6530
B. FAIRBROTHER 6-1-68
DO NOT SCALE DRAWING
EMR SARASOTA DIVISION ELECTRO MECHANICAL RESEARCH, INC. - SARASOTA, FLORIDA © EMR, INC. 1968
SYSTEM SCHEMATIC MODEL 6530
06141 D 16135 D
SCALE NONE 965-01-00972 SHEET 1 OF 1

# SECTION 6

# PARTS LIST AND RECOMMENDED SPARES

## 6.1 GENERAL

This section contains information concerning parts replacement, spares provisioning, and parts ordering for the EMR 4530. A complete list of the parts information is contained in Table 6-1 and described in paragraph 6.2. Recommended spares, spares provisioning information, and parts ordering information are contained in paragraphs 6.3, 6.4, and 6.5, respectively.

## 6.2 PARTS LIST DESCRIPTION

### 6.2.1 Variable Chart

The variable chart, EMR drawing 14993, contains the top level parts information for the 4530. This drawing provides the complete model number of the unit and information describing the variable digits of the model number. The tables on the top of the model number illustrate all available versions of the 4530 and the corresponding model numbers. The lower left table under the model number contains EMR parts list numbers and part numbers for the various models. Knob, handle, and trim parts information is contained in the lower right table under the model number.

### 6.2.2 Parts List

The parts lists in this section are provided in descending order starting with the top assembly parts lists and continuing through all subassemblies and components. A complete tabulation of the parts lists and the order in which they appear in this section are contained in Table 6-1. Table 6-1 also contains the parts list number, used on information, and the page number on which each parts list starts.

Each parts list number corresponds to the assembly number and drawing number in which the parts are illustrated. Drawings illustrating the parts in the parts lists are contained in Section 5 of this manual. For example, the parts listed in PL-14991 are illustrated on EMR drawing 14991 in Section 5. Certain assemblies and subassemblies contain dash (-) configurations of the assembly, e.g., PL-14991-1. Dash numbers are used to identify different configurations of the same assembly. However, all parts listed on PL-14991, 14991-1, etc., are illustrated on EMR drawing 14991.

The parts list for each top assembly (14991, 14991-1, etc.) contains a listing of all subassemblies in the configuration. The subassemblies are identified by an item number in the ITEM NO. column. These item numbers correspond to numbers in the reference balloons on the top assembly drawing 14991.

The subassemblies are broken down in separate parts lists. Parts lists for the subassemblies are identified by the subassembly number in the DRAWING OR SPEC NO. column. Further parts list breakdown from this point is in the same manner.

Also included in the parts lists for each item is the quantity required (QTY. REQ'D.), EMR PART NUMBER, DESCRIPTION, VENDOR NAME, and VENDOR PART NUMBER. The listings in the VENDOR NAME column are abbreviations for the particular vendors. These abbreviations and complete vendor identification are contained in Table 6-3. Any part listed in the parts lists may be ordered directly from EMR or may be purchased from the original vendor.

## 6.3 RECOMMENDED SPARES

A list of the recommended spare parts for the 4530 is contained in Table 6-2. The recommended spares, as listed in this Table, are based on the following conditions:

a. Operating time -- 8 hours/day, 5 days/week (2080 hours/year).

b. Operating temperature -- $0^{\circ}C$ to $30^{\circ}C$.

c. User has capability to repair to the component level.

d. Failure rates are constant.

e. A 0.9 probability of being able to repair from the recommended complement for one year.

f. Equipment will be used as ground equipment (as opposed to vehicular or airborne).

The recommended spares table contains a PART DESCRIPTION column, an EMR STOCK NO. column, a VENDOR NAME column, a VENDOR PART NO. column, a TQ column which is the total quantity of the part in the unit, and an RS column which lists the number of recommended spares for the part. The listings in the VENDOR NAME column are abbreviations for the particular vendors. These abbreviations and complete vendor identification are described in Table 6-3.

## 6.4 PROVISIONING CONSIDERATIONS

The selection of an optimum spare parts complement involves a number of considerations known only to the user. These considerations include operating

time and cycles, operating environment, number of equipments to be spared and their locations with respect to one another, urgency of returning an equipment to service, troubleshooting, repair and test capability, stock of commonly used parts, etc.

Sparing considerations known to EMR include mean-time-between-failures for parts and assemblies under various operating environments, prices, relative ease of troubleshooting, repair, retest, etc.

Table 6-4 lists the type of information required in order for EMR to recommend an optimum spare parts complement for specific operating and logistic situations. If the information outlined in Table 6-4 is supplied to EMR, a recommended list will be furnished at no cost for each individual situation.

## 6.5 ORDERING INSTRUCTIONS

When ordering parts, complete description of each part as listed in DESCRIPTION column of parts list must accompany order. Also included, must be the EMR stock number and vendor's name and part number.

Table 6-1. Parts List Breakdown

| NAME | NUMBER | USED ON | PAGE |
|---|---|---|---|
| MODEL 4530 VARIABLE CHART | 14993 | ALL MODELS | -- |
| OSCILLATOR ASSEMBLY | PL-14991 | 4530-01 and -71 | 6-6 |
| OSCILLATOR ASSEMBLY | PL-14991-1 | 4530-02 and -72 | 6-7 |
| OSCILLATOR ASSEMBLY | PL-14991-2 | 4530-92 | 6-8 |
| OSCILLATOR ASSEMBLY | PL-14991-3 | 4530-03, -04, -73, and -74 | 6-9 |
| OSCILLATOR ASSEMBLY | PL-14991-4 | 4530-93 and -94 | 6-10 |
| CHASSIS ASSEMBLY | PL-14992 | ALL MODELS EXCEPT 4530-92, -93, and -94 | 6-11 |
| CHASSIS ASSEMBLY | PL-14992-1 | 4530-92, -93, and -94 | 6-13 |
| FRONT PANEL ASSEMBLY | PL-14990 | ALL MODELS | 6-14 |
| POWER SUPPLY REGULATOR CARD | PL-15799 | ALL MODELS EXCEPT 4530-9X SERIES | 6-15 |
| CALIBRATE CARD | PL-15906 | 4530-01 and -71 | 6-19 |
| CALIBRATE CARD | PL-15906-1 | 4530-02 and -72 | 6-20 |
| CALIBRATE CARD | PL-15906-2 | 4530-92 | 6-21 |
| CALIBRATE CARD | PL-15906-3 | 4530-03, -04, -73, and -74 | 6-22 |
| CALIBRATE CARD | PL-15906-4 | 4530-93 and -94 | 6-24 |
| VCO CARD | PL-15796 | ALL MODELS | 6-26 |

| REVISIONS | | | | |
|---|---|---|---|---|
| SYM | DESCRIPTION | ENGR. APPROVAL | DATE | APPROVED |

| | |
|---|---|
| 9 | 115 V AC |
| 8 | 230 V, 60 HZ |
| 7 | 120 V, 400 HZ |
| 0 | 120 V, 60 HZ |
| | POWER & DPLY OES W/ SEQ |

| | |
|---|---|
| 4 | INTERNAL CAL LOCAL CONTROL |
| 3 | INTERNAL CAL. REMOTE CONTROL |
| 2 | EXTERNAL CAL. REMOTE CONTROL |
| | NO CALIBRATION |
| | OSCILLATOR CONFIGURATION DESIGN SEQ. |

| | |
|---|---|
| 93 | SPECIAL |
| 04 | GREY FED 26492 BLACK |
| 08 | DARK GREEN 00049 WHITE |
| 01 | LIGHT GREEN 00048 WHITE |
| | PANEL COLOR LETTERING |

VCO#1 CENTER FREQ 300 KHZ TO 1.5 MHZ | VCO#1 DEVIATION 12.5% TO A | VCO#2 CENTER FREQ 300 KHZ TO 1.5 MHZ | VCO#2 DEVIATION 12.5% TO 100% | CALIBRATE VOLTAGE NEGATIVE / POSITIVE

MODEL 4530-XX-XXXX.XXX-XXX.XX-(XX OR XX)-XXXX.XXX-XXX.XX-(XX OR XX)-XX.XX-XX.XX-XX

| | PARTS LIST | PART NO |
|---|---|---|
| C1, 11 | PL-14991 | 184-89-00033 |
| C2, 12 | PL-4991-1 | 184-89-00034 |
| RE | PL-4991-2 | 184-89-00047 |
| C3, C4, 13, 14 | PL-14991-3 | 184-89-00048 |
| 33, 34 | PL-14991-4 | 184-89-00049 |

| | 999-01-00001 KNOB | | | 999-01-00002 HANDLE | | | | 999-01-00003 TRIM | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | DWG NO | COLOR | PART NO | QTY | DWG NO | COLOR | PART NO | QTY | DWG NO | COLOR | PART NO | QTY |
| 01 | W076 | LT. GREEN | 188-99-00018 | 1 | 5860-1 | DK GREEN | 188-99-00006 | 1 | W011 | POLISH | 256-99-00011 | 1 |
| 02 | 6076-1 | DK. GREEN | 188-99-00022 | 1 | 5860-1 | DK GREEN | 188-99-00006 | 1 | W011 | POLISH | 256-99-00011 | 1 |
| 04 | 6076-2 | BLACK | 188-99-00023 | 1 | 5860-2 | BLACK | 188-99-00007 | 1 | W011-1 | BLACK | 256-99-00012 | 1 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | | | | |
| | | | | | | |
| | | | | | | |

EMR - TELEMETRY

PARTS LIST 14991 REV DATE 09/20/68 REV LTR D

LIST TITLE OSC,ASSY
PART NO. 184-89-00035

CHGE CONT NO. CODE IDENT SHT 1 OF
ECO 34577 06141 CKD BY

| ITEM NO. | QTY REQD | E M R PART NUMBER | DRAWING OR SPEC NO. | DESCRIPTION | VENDOR NAME | VENDOR PART NUMBER |
|---|---|---|---|---|---|---|
| 1 | 1 | 042-89-00090 | 14992 | CHAS,ASSY | SPEC | 14992 |
| 2 | 1 | 191-89-00246 | 14990 | PANEL,ASSY | SPEC | 14990 |
| 3 | 1 | 999-01-00001 | 14993 | KNOB,POA VAR | | |
| 4 | 1 | 999-01-00002 | 14993 | HANDLE,POA VAR | | |
| 5 | 1 | 075-89-00012 | 6650 | COVER,ASSY | SPEC | 6650 |
| 6 | 1 | 205-89-00494 | 15799 | PWA,POWER SUPPLY REG | SPEC | 15799 |
| 7 | 1 | 205-89-00495 | 15906 | PWA,CALIBRATE CARD NO CAL | SPEC | 15906 |
| 8 | 2 | 205-89-00406 | 15796 | PWA,VCO | SPEC | 15796 |
| 10 | 1 | 127-98-00008 | | GROM | HARTWELL | H559-4-1 |
| 11 | 2 | 287-02-00016 | | NUT,HEX,4-40 SST | QVL | NAS 671-C4 |
| 12 | 2 | 273-02-00046 | | WASHER,#4,FLAT,SS | QVL | NAS620C4 |
| 13 | 2 | 273-02-00036 | | WASHER,#4,SPLIT LOCK | QVL | MS35338-135 |
| 14 | 2 | 229-02-00072 | | SCREW,4-40X3/16 PAN HD | QVL | MS51957-12 |
| 15 | A/R | 060-11-00001 | | COMP, LOCTITE, GRADE D | AMER SEALANT | BY DESCRIPTION |
| 16 | 6 | 229-02-00073 | | SCREW,4-40X1/4 PAN HD | QVL | MS51957-13 |
| 17 | 2 | 273-98-00011 | | WASHER,#4, FIBER | H H SMITH | 2161 |
| 18 | 2 | 229-02-00074 | | SCREW,4-40X5/16 PAN HD | QVL | MS51957-14 |
| REF1 | 1 | 905-01-00372 | 16135 | SCHEMATIC | SPEC | 16135 |
| REF2 | 1 | 905-05-00138 | 14993 | VARIABLE CHART | SPEC | 14993 |
| REF3 | 1 | 905-07-00081 | 15777 | SPEC,PRODUCT | SPEC | 15777 |
| REF4 | 1 | 905-06-00038 | 15778 | SPEC,SETUP | SPEC | 15778 |

FIRST USAGE MODEL 4530-016-71

EMR - TELEMETRY

PARTS LIST 14991-1 REV DATE REV LTR

LIST TITLE OSC,ASSY
PART NO. 164-89-00046 CHGE CONT NO. CODE IDENT 06141 SHT 1 OF
ECO CKD BY

| ITEM NO. | QTY REQD | E M R PART NUMBER | DRAWING OR SPEC NO. | DESCRIPTION | VENDOR NAME | VENDOR PART NUMBER |
|---|---|---|---|---|---|---|
| 1 | 1 | 042-89-00090 | 14992 | CHAS,ASSY | SPEC | 14992 |
| 2 | 1 | 191-89-00246 | 14990 | PANEL,ASSY | SPEC | 14990 |
| 3 | 1 | 999-01-00001 | 14993 | KNOB,POA VAR | | |
| 4 | 1 | 999-01-00002 | 14993 | HANDLE,POA VAR | | |
| 5 | 1 | 075-89-00012 | 6650 | COVER,ASSY | SPEC | 6650 |
| 6 | 1 | 205-89-00494 | 15799 | PWA,POWER SUPPLY REG | SPEC | 15799 |
| 7 | 1 | 205-89-00496 | 15906-1 | PWA,CALIBRATE CARD EXT CA | SPEC | 15906-1 |
| 8 | 2 | 205-89-00406 | 15796 | PWA,VCO | SPEC | 15796 |
| 10 | 1 | 127-98-00008 | | GROM | HARTWELL | H559-4-1 |
| 11 | 2 | 287-02-00016 | | NUT,HEX,4-40 SST | QVL | NAS 671-C4 |
| 12 | 2 | 273-02-00046 | | WASHER,#4,FLAT,SS | QVL | NAS620C4 |
| 13 | 2 | 273-02-00036 | | WASHER,#4,SPLIT LOCK | QVL | MS35338-135 |
| 14 | 2 | 229-02-00072 | | SCREW,4-40X3/16 PAN HD | QVL | MS51957-12 |
| 15 | A/R | 060-11-00001 | | COMP, LOCTITE, GRADE D | AMER SEALANT | BY DESCRIPTION |
| 16 | 6 | 229-02-00073 | | SCREW,4-40X1/4 PAN HD | QVL | MS51957-13 |
| 17 | 2 | 273-98-00011 | | WASHER,#4, FIBER | H H SMITH | 2161 |
| 18 | 2 | 229-02-00074 | | SCREW,4-40X5/16 PAN HD | QVL | MS51957-14 |
| REF1 | 1 | 905-01-00372 | 16135 | SCHEMATIC | SPEC | 16135 |
| REF2 | 1 | 905-05-00138 | 14993 | VARIABLE CHART | SPEC | 14993 |
| REF3 | 1 | 905-07-00081 | 15777 | SPEC,PRODUCT | SPEC | 15777 |
| REF4 | 1 | 905-06-00038 | 15778 | SPEC,SETUP | SPEC | 15778 |

FIRST USAGE MODEL 4530-02&72

EMR - TELEMETRY

PARTS LIST 14991-2 REV DATE REV LTR

LIST TITLE OSC,ASSY CHGE CONT NO. CODE IDENT SHT 1 OF
PART NO. 194-89-00047 ECO 06141 CKD BY

| ITEM NO. | QTY REQD | E M R PART NUMBER | DRAWING OR SPEC NO. | DESCRIPTION | VENDOR NAME | VENDOR PART NUMBER |
|---|---|---|---|---|---|---|
| 1 | 1 | 042-89-00118 | 14992-1 | CHAS,ASSY | SPEC | 14992-1 |
| 2 | 1 | 191-89-00246 | 14990 | PANEL,ASSY | SPEC | 14990 |
| 3 | 1 | 999-01-00001 | 14993 | KNOB,POA VAR | | |
| 4 | 1 | 999-01-00002 | 14993 | HANDLE,POA VAR | | |
| 5 | 1 | 075-89-00012 | 6650 | COVER,ASSY | SPEC | 6650 |
| 7 | 1 | 205-89-00497 | 15906-2 | PWA,CALIBRATE CARD EXT CA | SPEC | 15906-2 |
| 8 | 2 | 205-89-00406 | 15796 | PWA,VCO | SPEC | 15796 |
| 10 | 1 | 127-98-00008 | | GROM | HARTWELL | H559-4-1 |
| 11 | 2 | 287-02-00016 | | NUT,HEX,4-40 SST | QVL | NAS 671-C4 |
| 12 | 2 | 273-02-00046 | | WASHER,#4,FLAT,SS | QVL | NAS620C4 |
| 13 | 2 | 273-02-00036 | | WASHER,#4,SPLIT LOCK | QVL | MS35338-135 |
| 14 | 2 | 229-02-00072 | | SCREW,4-40X3/16 PAN HD | QVL | MS51957-12 |
| 15 | A/R | 060-11-00001 | | COMP, LOCTITE, GRADE D | AMER SEALANT | BY DESCRIPTION |
| 16 | 6 | 229-02-00073 | | SCREW,4-40X1/4 PAN HD | QVL | MS51957-13 |
| REF1 | 1 | 905-01-00372 | 16135 | SCHEMATIC | SPEC | 16135 |
| REF2 | 1 | 905-05-00138 | 14993 | VARIABLE CHART | SPEC | 14993 |
| REF3 | 1 | 905-07-00081 | 15777 | SPEC,PRODUCT | SPEC | 15777 |
| REF4 | 1 | 905-06-00038 | 15778 | SPEC,SETUP | SPEC | 15778 |

FIRST USAGE MODEL 4530-92

PARTS LIST 14991-3 REV DATE REV LTR

LIST TITLE OSC,ASSY
PART NO. 104-89-00048 CHGE CONT NO. CODE IDENT 06141 SHT 1 OF
ECO CKD BY

| ITEM NO. | QTY REQD | E M R PART NUMBER | DRAWING OR SPEC NO. | DESCRIPTION | VENDOR NAME | VENDOR PART NUMBER |
|---|---|---|---|---|---|---|
| 1 | 1 | 042-89-00090 | 14992 | CHAS,ASSY | SPEC | 14992 |
| 2 | 1 | 191-89-00246 | 14990 | PANEL,ASSY | SPEC | 14990 |
| 3 | 1 | 999-01-00001 | 14993 | KNOB,POA VAR | | |
| 4 | 1 | 999-01-00002 | 14993 | HANDLE,POA VAR | | |
| 5 | 1 | 075-89-00012 | 6650 | COVER,ASSY | SPEC | 6650 |
| 6 | 1 | 205-89-00494 | 15799 | PWA,POWER SUPPLY REG | SPEC | 15799 |
| 7 | 1 | 205-89-00498 | 15906-3 | PWA,CALIBRATE CARD INT CA | SPEC | 15906-3 |
| 8 | 2 | 205-89-00406 | 15796 | PWA,VCO | SPEC | 15796 |
| 10 | 1 | 127-98-00008 | | GROM | HARTWELL | H559-4-1 |
| 11 | 2 | 287-02-00016 | | NUT,HEX,4-40 SST | QVL | NAS 671-C4 |
| 12 | 2 | 273-02-00046 | | WASHER,#4,FLAT,SS | QVL | NAS620C4 |
| 13 | 2 | 273-02-00036 | | WASHER,#4,SPLIT LOCK | QVL | MS35338-135 |
| 14 | 2 | 229-02-00072 | | SCREW,4-40X3/16 PAN HD | QVL | MS51957-12 |
| 15 | A/R | 060-11-00001 | | COMP, LOCTITE, GRADE D | AMER SEALANT | BY DESCRIPTION |
| 16 | 6 | 229-02-00073 | | SCREW,4-40X1/4 PAN HD | QVL | MS51957-13 |
| 17 | 2 | 273-98-00011 | | WASHER,#4, FIBER | H H SMITH | 2161 |
| 18 | 2 | 229-02-00074 | | SCREW,4-40X5/16 PAN HD | QVL | MS51957-14 |
| REF1 | 1 | 905-01-00372 | 16135 | SCHEMATIC | SPEC | 16135 |
| REF2 | 1 | 905-05-00138 | 14993 | VARIABLE CHART | SPEC | 14993 |
| REF3 | 1 | 905-07-00081 | 15777 | SPEC,PRODUCT | SPEC | 15777 |
| REF4 | 1 | 905-06-00038 | 15778 | SPEC,SETUP | SPEC | 15778 |

FIRST USAGE MODEL 4530,03,04,73674

EMR - TELEMETRY

PARTS LIST 14991-4 REV DATE REV LTR

LIST TITLE USC,ASSY
PART NO. 184-89-00049 CHGE CONT NO. ECO CODE IDENT 06141 SHT 1 OF CKD BY

| ITEM NO. | QTY REQD | EMR PART NUMBER | DRAWING OR SPEC NO. | DESCRIPTION | VENDOR NAME | VENDOR PART NUMBER |
|---|---|---|---|---|---|---|
| 1 | 1 | 042-89-00118 | 14992-1 | CHAS,ASSY | SPEC | 14992-1 |
| 2 | 1 | 191-89-00246 | 14990 | PANEL,ASSY | SPEC | 14990 |
| 3 | 1 | 999-01-00001 | 14993 | KNOB,POA VAR | | |
| 4 | 1 | 999-01-00002 | 14993 | HANDLE,POA VAR | | |
| 5 | 1 | 075-89-00012 | 6650 | COVER,ASSY | SPEC | 6650 |
| 7 | 1 | 205-89-00499 | 15906-4 | PWA,CALIBRATE CARD INT CA | SPEC | 15906-4 |
| 8 | 2 | 205-89-00406 | 15796 | PWA,VCO | SPEC | 15796 |
| 10 | 1 | 127-98-00008 | | GROM | HARTWELL | H559-4-1 |
| 11 | 2 | 287-02-00016 | | NUT,HEX,4-40 SST | QVL | NAS 671-C4 |
| 12 | 2 | 273-02-00046 | | WASHER,#4,FLAT,SS | QVL | NAS620C4 |
| 13 | 2 | 273-02-00036 | | WASHER,#4,SPLIT LOCK | QVL | MS35338-135 |
| 14 | 2 | 229-02-00072 | | SCREW,4-40X3/16 PAN HD | QVL | MS51957-12 |
| 15 | A/R | 060-11-00001 | | COMP, LOCTITE, GRADE D | AMER SEALANT | BY DESCRIPTION |
| 16 | 6 | 229-02-00073 | | SCREW,4-40X1/4 PAN HD | QVL | MS51957-13 |
| REF1 | 1 | 905-01-00372 | 16135 | SCHEMATIC | SPEC | 16135 |
| REF2 | 1 | 905-05-00138 | 14993 | VARIABLE CHART | SPEC | 14993 |
| REF3 | 1 | 905-07-00081 | 15777 | SPEC,PRODUCT | SPEC | 15777 |
| REF4 | 1 | 905-06-00038 | 15778 | SPEC,SETUP | SPEC | 15778 |

FIRST USAGE MODEL 4530-93694

PARTS LIST 14992 REV DATE 08/30/68 REV LTR C

LIST TITLE CHAS,ASSY
PART NO. 042-89-00090

CHGE CONT NO. CODE IDENT SHT 1 OF
ECO RECORD 1 06141 CKD BY

| ITEM NO. | QTY REQD | E M R PART NUMBER | DRAWING OR SPEC NO. | DESCRIPTION | VENDOR NAME | VENDOR PART NUMBER |
|---|---|---|---|---|---|---|
| 1 | 1 | 042-89-00092 | 15723 | CHAS,ASSY,WELDMENT | SPEC | 15723 |
| 2 | 1 | 205-89-00500 | 15908 | PWA,INTERCONNECT CARD | SPEC | 15908 |
| 3 | 1 | 134-98-00016 | | HOLDER,FUSE | LITTLEFUSE | 281002 |
| 4 | 1 | 120-98-00038 | 273001 | FUSE,MICRO,1 AMP 125V | LITTELFUSE | 273001 |
| 5 | 1 | 063-98-00042 | | CONN,PLUG,16PIN,R&P | AMPHENOL | 26-159-16 |
| 6 | 1 | 262-99-00067 | 15893 | XFMR | SPEC | 15893 |
| 7 | 4 | 229-02-00106 | | SCREW,8-32X7/8 PAN HD | QVL | MS51957-48 |
| 8 | 10 | 229-02-00073 | | SCREW,4-40X1/4 PAN HD | QVL | MS51957-13 |
| 9 | 8 | 273-98-00036 | | WASHER,#8,FIBRE .168ID | SEASTROM | 5602-82-093 |
| 10 | 8 | 273-98-00035 | | WASHER,#8,FIBRE .175ID | SEASTROM | 5602-79-062 |
| 12 | 2 | 287-02-00016 | | NUT,HEX,4-40 SST | QVL | NAS 671-C4 |
| 13 | 2 | 273-02-00025 | | WASHER,#4,INT TOOTH | QVL | MS35333-70 |
| 16 | 4 | 229-02-00186 | | SCREW,4-40X5/16,FLT HD | QVL | MS51959-14 |
| 17 | 4 | 273-02-00046 | | WASHER,#4,FLAT,SS | QVL | NAS620C4 |
| 18 | 4 | 287-02-00016 | | NUT,HEX,4-40 SST | QVL | NAS 671-C4 |
| 19 | A/R | 268-98-00013 | | TUBING,3/4,SHRINK,BLK | ALPHLEX | PVC-105 |
| 20 | 1 | 255-02-00004 | | TERM.,LUG,SOLDER,#8,LOCK | QVL | MS77070-3 |
| 21 | 4 | 273-02-00008 | | WASHER,#8, FLT ST STL | QVL | MS15795-607 |
| 22 | 4 | 273-02-00021 | | WASHER,#8,EXT TOOTH | QVL | MS35335-59 |
| 23 | 1 | 250-98-00045 | | SWITCH,ROT.,2P,2-5POS,NS | ALCO | MRA-2-5S |
| 24 | 1 | 255-98-00048 | | TERM, SOLDER LUG, #4 | BIRNBACK | 193 |
| Q1 | 1 | 263-10-49220 | | XSTR,NPN,SW AMPL 60V,1A | JEDEC | 2N4922 |

FIRST USAGE MODEL 4530

| ITEM NO. | QTY REQD | E M R PART NUMBER | DRAWING OR SPEC NO. | DESCRIPTION | VENDOR NAME | VENDOR PART NUMBER |
|---|---|---|---|---|---|---|
| Q2 | 1 | 263-10-49190 | | XSTR,PNP,SW AMPL 60V,1A | JEDEC | 2N4919 |
| Q3 | 1 | 263-10-49220 | | XSTR,NPN,SW AMPL 60V,1A | JEDEC | 2N4922 |
| Q4 | 1 | 263-10-49190 | | XSTR,PNP,SW AMPL 60V,1A | JEDEC | 2N4919 |

FIRST USAGE MODEL 4530

EMR - TELEMETRY

PARTS LIST 14992-1 REV DATE REV LTR

LIST TITLE CHAS,ASSY CHGE CONT NO. CODE IDENT SHT 1 OF
PART NO. 042-89-00118 ECO 06141 CKD BY

| ITEM NO. | QTY REQD | E M R PART NUMBER | DRAWING OR SPEC NO. | DESCRIPTION | VENDOR NAME | VENDOR PART NUMBER |
|---|---|---|---|---|---|---|
| 1 | 1 | 042-89-00092 | 15723 | CHAS,ASSY,WELDMENT | SPEC | 15723 |
| 2 | 1 | 205-89-00500 | 15908 | PWA,INTERCONNECT CARD | SPEC | 15908 |
| 3 | 1 | 134-98-00016 | | HOLDER,FUSE | LITTLEFUSE | 281002 |
| 4 | 1 | 120-98-00038 | 273001 | FUSE,MICRO,1 AMP 125V | LITTELFUSE | 273001 |
| 5 | 1 | 063-98-00042 | | CONN,PLUG,16PIN,R&P | AMPHENOL | 26-159-16 |
| 8 | 10 | 229-02-00073 | | SCREW,4-40X1/4 PAN HD | QVL | MS51957-13 |
| 9 | 6 | 273-98-00036 | | WASHER,#8,FIBRE .188ID | SEASTROM | 5602-82-093 |
| 10 | 6 | 273-98-00035 | | WASHER,#8,FIBRE .175ID | SEASTROM | 5602-79-062 |
| 12 | 2 | 287-02-00016 | | NUT,HEX,4-40 SST | QVL | NAS 671-C4 |
| 13 | 2 | 273-02-00025 | | WASHER,#4,INT TOOTH | QVL | MS35333-70 |
| 16 | 4 | 229-02-00186 | | SCREW,4-40X5/16,FLT HD | QVL | MS51959-14 |
| 17 | 4 | 273-02-00046 | | WASHER,#4,FLAT,SS | QVL | NAS620C4 |
| 18 | 4 | 287-02-00016 | | NUT,HEX,4-40 SST | QVL | NAS 671-C4 |
| 19 | A/R | 268-98-00013 | | TUBING,3/4,SHRINK,BLK | ALPHLEX | PVC-105 |
| 23 | 1 | 250-98-00045 | | SWITCH,ROT.,2P,2-5POS,NS | ALCO | MRA-2-5S |
| 24 | 1 | 255-98-00048 | | TERM, SOLDER LUG, #4 | BIRNBACK | 193 |
| Q1 | 1 | 263-10-49220 | | XSTR,NPN,SW AMPL 60V,1A | JEDEC | 2N4922 |
| Q2 | 1 | 263-10-49190 | | XSTR,PNP,SW AMPL 60V,1A | JEDEC | 2N4919 |
| Q3 | 1 | 263-10-49220 | | XSTR,NPN,SW AMPL 60V,1A | JEDEC | 2N4922 |
| Q4 | 1 | 263-10-49190 | | XSTR,PNP,SW AMPL 60V,1A | JEDEC | 2N4919 |

FIRST USAGE MODEL 4530-92,93694

EMR - TELEMETRY

PARTS LIST 14990 REV DATE REV LTR

LIST TITLE PANEL,ASSY
PART NO. 191-89-00246 CHGE CONT NO. ECO CODE IDENT 06141 SHT 1 OF CKD BY

| ITEM NO. | QTY REQD | E M R PART NUMBER | DRAWING OR SPEC NO. | DESCRIPTION | VENDOR NAME | VENDOR PART NUMBER |
|---|---|---|---|---|---|---|
| 1 | 1 | 191-89-00247 | 15717 | PANEL,ASSY | SPEC | 15717 |
| 2 | 1 | 999-04-00003 | 14993 | STRIP,POA VAR | | |
| 3 | 2 | 412-99-00007 | 15718 | IDENT,RET | SPEC | 15718 |
| 4 | 1 | 016-99-00041 | 6012 | BRKT, LOCATING | SPEC | 6012 |
| 5 | 4 | 143-98-00006 | | JACK,TEST,WHITE | SEALECTRO | SKT-8-WHITE |
| 6 | 2 | 229-02-00217 | | SCREW,0X3/16,RND HD | QVL | MS21318-8 |
| 7 | 7 | 229-02-00216 | | SCREW,00X3/16,RND HD | QVL | MS21318-2 |
| REF1 | 1 | 905-10-00188 | MYL-14990 | ARTWORK,FRONT PANEL | SPEC | MYL-14990 |
| REF2 | 1 | 905-05-00138 | 14993 | VARIABLE CHART | SPEC | 14993 |

FIRST USAGE MODEL 4530

EMR - TELEMETRY

PARTS LIST 15799 REV DATE REV LTR A

LIST TITLE PWA,POWER SUPPLY REG CHGE CONT NO. CODE IDENT SHT 1 OF
PART NO. 205-89-00494 ECO 33655 06141 CKD BY

| ITEM NO. | QTY REQD | E M R PART NUMBER | DRAWING OR SPEC NO. | DESCRIPTION | VENDOR NAME | VENDOR PART NUMBER |
|---|---|---|---|---|---|---|
| 1 | 1 | 204-89-00191 | 15798 | PWB,REG | SPEC | 15798 |
| 2 | 18 | 065-98-00012 | | CONT,SOCKET | AMP | 85861-4 |
| 3 | 12 | 189-98-00004 | | PAD,XSTR TO-18 4 PIN,.15 | DEL BLINN | TP-100 |
| C1 | 1 | 354-59-25005 | | CAP., 250MF -10&75% 40V | SPRAGUE | 39D257G040GE4 |
| C2 | 1 | 336-23-10003 | 601 | CAP., 1.0MF 20% 35V | SPEC | 601 |
| C3 | 1 | 354-59-25005 | | CAP., 250MF -10&75% 40V | SPRAGUE | 39D257G040GE4 |
| C4 | 1 | 336-23-10003 | 601 | CAP., 1.0MF 20% 35V | SPEC | 601 |
| C5 | 1 | 354-59-25005 | | CAP., 250MF -10&75% 40V | SPRAGUE | 39D257G040GE4 |
| C6 | 1 | 336-23-10003 | 601 | CAP., 1.0MF 20% 35V | SPEC | 601 |
| C7 | 1 | 354-59-25005 | | CAP., 250MF -10&75% 40V | SPRAGUE | 39D257G040GE4 |
| C8 | 1 | 336-23-10003 | 601 | CAP., 1.0MF 20% 35V | SPEC | 601 |
| CR1 | 1 | 214-98-00003 | | RECT,MDA920A-3 | MOT | MDA920A-3 |
| CR2 | 1 | 088-10-41480 | | DIODE | JEDEC | 1N4148 |
| CR3 | 1 | 088-10-09360 | | DIODE,REF,9V/7.5MA,.005 % | JEDEC | 1N936 |
| CR4 | 1 | 088-10-40020 | | DIODE,RECTIFIER 100V,1A,I | JEDEC | 1N4002 |
| CR5 | 1 | 088-10-41480 | | DIODE | JEDEC | 1N4148 |
| CR6 | 1 | 088-10-09360 | | DIODE,REF,9V/7.5MA,.005 % | JEDEC | 1N936 |
| CR7 | 1 | 088-10-40020 | | DIODE,RECTIFIER 100V,1A,I | JEDEC | 1N4002 |
| CR8 | 1 | 214-98-00003 | | RECT,MDA920A-3 | MOT | MDA920A-3 |
| CR9 | 1 | 088-10-41480 | | DIODE | JEDEC | 1N4148 |
| CR10 | 1 | 088-10-09360 | | DIODE,REF,9V/7.5MA,.005 % | JEDEC | 1N936 |
| CR11 | 1 | 088-10-40020 | | DIODE,RECTIFIER 100V,1A,I | JEDEC | 1N4002 |

FIRST USAGE MODEL 4530

| ITEM NO. | QTY REQD | E M R PART NUMBER | DRAWING OR SPEC NO. | DESCRIPTION | VENDOR NAME | VENDOR PART NUMBER |
|---|---|---|---|---|---|---|
| CR12 | 1 | 088-10-41480 | | DIODE | JEDEC | 1N4148 |
| CR13 | 1 | 088-10-09360 | | DIODE,REF,9V/7.5MA,.005 % | JEDEC | 1N936 |
| CR14 | 1 | 088-10-40020 | | DIODE,RECTIFIER 100V,1A,I | JEDEC | 1N4002 |
| Q1 | 1 | 263-99-00139 | 805-1 | XSTR,PNP 2N3251 SW-AMP,50 | SPEC | 805-1 |
| Q3 | 1 | 263-10-39470 | | XSTR | JEDEC | 2N3947 |
| Q4 | 1 | 263-10-39470 | | XSTR | JEDEC | 2N3947 |
| Q5 | 1 | 263-99-00139 | 805-1 | XSTR,PNP 2N3251 SW-AMP,50 | SPEC | 805-1 |
| Q6 | 1 | 263-99-00139 | 805-1 | XSTR,PNP 2N3251 SW-AMP,50 | SPEC | 805-1 |
| Q7 | 1 | 263-10-39470 | | XSTR | JEDEC | 2N3947 |
| Q9 | 1 | 263-99-00139 | 805-1 | XSTR,PNP 2N3251 SW-AMP,50 | SPEC | 805-1 |
| Q11 | 1 | 263-10-39470 | | XSTR | JEDEC | 2N3947 |
| Q12 | 1 | 263-10-39470 | | XSTR | JEDEC | 2N3947 |
| Q13 | 1 | 263-99-00139 | 805-1 | XSTR,PNP 2N3251 SW-AMP,50 | SPEC | 805-1 |
| Q14 | 1 | 263-99-00139 | 805-1 | XSTR,PNP 2N3251 SW-AMP,50 | SPEC | 805-1 |
| Q15 | 1 | 263-10-39470 | | XSTR | JEDEC | 2N3947 |
| R1 | 1 | 616-02-10001 | | RES,10K 5% 1/4W | ALLEN BRAD | RC07GF103J |
| R2 | 1 | 616-02-10001 | | RES,10K 5% 1/4W | ALLEN BRAD | RC07GF103J |
| R3 | 1 | 616-02-15000 | | RES,1.5K 5% 1/4W | ALLEN BRAD | RC07GF152J |
| R4 | 1 | 616-02-12004 | | RES,12 MEG 5% 1/4W | ALLEN BRAD | RC07GF126J |
| R5 | 1 | 608-09-90900 | 624 | RES. 9.09K 1% 1/10W | SPEC | 624 |
| R6 | 1 | 616-02-20000 | | RES,2K 5% 1/4W | ALLEN BRAD | RC07GF202J |
| R7 | 1 | 616-02-91000 | | RES,9.1K 5% 1/4W | ALLEN BRAD | RC07GF912J |
| R8 | 1 | 608-09-00000 | 624 | RES,*T/VAR* 1% 1/10W | | |
| R9 | 1 | 616-02-20000 | | RES,2K 5% 1/4W | ALLEN BRAD | RC07GF202J |

FIRST USAGE MODEL 4530

| ITEM NO. | QTY REQD | E M R PART NUMBER | DRAWING OR SPEC NO. | DESCRIPTION | VENDOR NAME | VENDOR PART NUMBER |
|---|---|---|---|---|---|---|
| R10 | 1 | 616-02-91000 | | RES,9.1K 5% 1/4W | ALLEN BRAD | RC07GF912J |
| R11 | 1 | 608-09-00000 | 624 | RES,*T/VAR* 1% 1/10W | | |
| R12 | 1 | 616-02-10001 | | RES,10K 5% 1/4W | ALLEN BRAD | RC07GF103J |
| R13 | 1 | 616-02-10001 | | RES,10K 5% 1/4W | ALLEN BRAD | RC07GF103J |
| R14 | 1 | 616-02-15000 | | RES,1.5K 5% 1/4W | ALLEN BRAD | RC07GF152J |
| R15 | 1 | 616-02-12004 | | RES,12 MEG 5% 1/4W | ALLEN BRAD | RC07GF126J |
| R16 | 1 | 608-09-90900 | 624 | RES. 9.09K 1% 1/10W | SPEC | 624 |
| R17 | 1 | 616-02-10001 | | RES,10K 5% 1/4W | ALLEN BRAD | RC07GF103J |
| R18 | 1 | 616-02-10001 | | RES,10K 5% 1/4W | ALLEN BRAD | RC07GF103J |
| R19 | 1 | 616-02-15000 | | RES,1.5K 5% 1/4W | ALLEN BRAD | RC07GF152J |
| R20 | 1 | 616-02-12004 | | RES,12 MEG 5% 1/4W | ALLEN BRAD | RC07GF126J |
| R21 | 1 | 608-09-90900 | 624 | RES. 9.09K 1% 1/10W | SPEC | 624 |
| R22 | 1 | 616-02-20000 | | RES,2K 5% 1/4W | ALLEN BRAD | RC07GF202J |
| R23 | 1 | 616-02-91000 | | RES,9.1K 5% 1/4W | ALLEN BRAD | RC07GF912J |
| R24 | 1 | 608-09-00000 | 624 | RES,*T/VAR* 1% 1/10W | | |
| R25 | 1 | 616-02-20000 | | RES,2K 5% 1/4W | ALLEN BRAD | RC07GF202J |
| R26 | 1 | 616-02-91000 | | RES,9.1K 5% 1/4W | ALLEN BRAD | RC07GF912J |
| R27 | 1 | 608-09-00000 | 624 | RES,*T/VAR* 1% 1/10W | | |
| R28 | 1 | 616-02-10001 | | RES,10K 5% 1/4W | ALLEN BRAD | RC07GF103J |
| R29 | 1 | 616-02-10001 | | RES,10K 5% 1/4W | ALLEN BRAD | RC07GF103J |
| R30 | 1 | 616-02-15000 | | RES,1.5K 5% 1/4W | ALLEN BRAD | RC07GF152J |
| R31 | 1 | 616-02-12004 | | RES,12 MEG 5% 1/4W | ALLEN BRAD | RC07GF126J |
| R32 | 1 | 608-09-90900 | 624 | RES. 9.09K 1% 1/10W | SPEC | 624 |
| R33 | 1 | 616-02-00000 | | RES, *T/VAR* 5% 1/4W | | |

FIRST USAGE MODEL 4530

| ITEM NO. | QTY REQD | E M R PART NUMBER | DRAWING OR SPEC NO. | DESCRIPTION | VENDOR NAME | VENDOR PART NUMBER |
|---|---|---|---|---|---|---|
| R34 | 1 | 616-02-00000 | | RES, *T/VAR* 5% 1/4W | | |
| R35 | 1 | 616-02-00000 | | RES, *T/VAR* 5% 1/4W | | |
| R36 | 1 | 616-02-00000 | | RES, *T/VAR* 5% 1/4W | | |
| REF1 | 1 | 905-01-00375 | 15797 | SCHEMATIC | SPEC | 15797 |
| REF2 | 1 | 905-04-00002 | 9500-1 | SPEC,COMPONENT SPACING | SPEC | 9500-1 |

FIRST USAGE MODEL 4530

PARTS LIST 15906 REV DATE 12/07/68 REV LTR D

LIST TITLE PWA,CALIBRATE CARD NO CAL CHGE CONT NO. CODE IDENT SHT 1 OF
PART NO. 205-89-00495 ECO 35313 06141 CKD BY

| ITEM NO. | QTY REQD | E M R PART NUMBER | DRAWING OR SPEC NO. | DESCRIPTION | VENDOR NAME | VENDOR PART NUMBER |
|---|---|---|---|---|---|---|
| 1 | 1 | 204-99-00395 | 15905 | PWB,CALIBRATE | SPEC | 15905 |
| 2 | 26 | 065-98-00012 | | CONT,SOCKET | AMP | 85861-4 |
| 3 | A/R | 276-99-00008 | 619-22 | WIRE,#22,BUSS,SOLID | SPEC | 619-22 |
| 4 | A/R | 268-02-00039 | | TUBING,#22,EXTR TEF,CLEAR | QVL | MIL-I-22129 |
| C1 | 1 | 337-23-68003 | 601 | CAP. 6.8MF 20% 35V | SPEC | 601 (S/N 1 THRU 80) |
| C1 | 1 | 337-22-15004 | 601 | CAP. 15MF 20% 20V | SPEC | 601 (S/N 81 AND UP) |
| C2 | 1 | 337-23-68003 | 601 | CAP. 6.8MF 20% 35V | SPEC | 601 (S/N 1. THRU 80) |
| C2 | 1 | 337-22-15004 | 601 | CAP. 15MF 20% 20V | SPEC | 601 (S/N 81 AND UP) |
| R1 | 1 | 616-02-03909 | | RES,39 OHM 5% 1/4W | ALLEN BRAD | RC07GF390J |
| R2 | 1 | 616-02-18009 | | RES,180 OHM 5% 1/4W | ALLEN BRAD | RC07GF181J |
| R3 | 1 | 616-02-10000 | | RES,1K 5% 1/4W | ALLEN BRAD | RC07GF102J |
| R14 | 1 | 616-02-10000 | | RES,1K 5% 1/4W | ALLEN BRAD | RC07GF102J |
| R15 | 1 | 616-02-03909 | | RES,39 OHM 5% 1/4W | ALLEN BRAD | RC07GF390J |
| R16 | 1 | 616-02-18009 | | RES,180 OHM 5% 1/4W | ALLEN BRAD | RC07GF181J |
| T1 | 1 | 262-99-00064 | 15802 | XFMR,OUTPUT | SPEC | 15802 (S/N 1 THRU 148) |
| T1 | 1 | 262-89-00043 | 15802-3 | XFMR, ASSY, OUTPUT | SPEC | 15802-3 (S/N 149 AND UP) |
| T2 | 1 | 262-99-00064 | 15802 | XFMR,OUTPUT | SPEC | 15802 (S/N 1 THRU 148) |
| T2 | 1 | 262-89-00043 | 15802-3 | XFMR, ASSY, OUTPUT | SPEC | 15802-3 (S/N 149 AND UP) |
| REF1 | 1 | 905-01-00376 | 15800 | SCHEMATIC | SPEC | 15800 |
| REF2 | 1 | 905-04-00002 | 9500-1 | SPEC,COMPONENT SPACING | SPEC | 9500-1 |

FIRST USAGE MODEL 4530

PARTS LIST 15906-1 REV DATE 08/19/68 REV LTR D

LIST TITLE PWA,CALIBRATE CARD EXT CA CHGE CONT NO. CODE IDENT SHT 1 OF
PART NO. 205-69-00496 ECO 34181 06141 CKD BY

| ITEM NO. | QTY REQD | E M R PART NUMBER | DRAWING OR SPEC NO. | DESCRIPTION | VENDOR NAME | VENDOR PART NUMBER |
|---|---|---|---|---|---|---|
| 1 | 1 | 204-69-00395 | 15905 | PWB,CALIBRATE | SPEC | 15905 |
| 2 | 26 | 065-98-00012 | | CONT,SOCKET | AMP | 85861-4 |
| 3 | A/R | 276-99-00008 | 619-22 | WIRE,#22,BUSS,SOLID | SPEC | 619-22 |
| 4 | A/R | 268-02-00039 | | TUBING,#22,EXTR TEF,CLEAR | QVL | MIL-I-22129 |
| C1 | 1 | 337-23-68003 | 601 | CAP. 6.8MF 20% 35V | SPEC | 601 (S/N 1 THRU 80) |
| C1 | 1 | 337-22-15004 | 601 | CAP. 15MF 20% 20V | SPEC | 601 (S/N 81 AND UP) |
| C2 | 1 | 337-23-68003 | 601 | CAP. 6.8MF 20% 35V | SPEC | 601 (S/N 1 THRU 80) |
| C2 | 1 | 337-22-15004 | 601 | CAP. 15MF 20% 20V | SPEC | 601 (S/N 81 AND UP) |
| CR1 | 1 | 088-10-41480 | | DIODE | JEDEC | 1N4148 |
| K1 | 1 | 219-98-00046 | | RELAY,2 FORM C CONTACTS | HATHAWAY INS | GP-2C-26-FCD |
| K3 | 1 | 219-98-00046 | | RELAY,2 FORM C CONTACTS | HATHAWAY INS | GP-2C-26-FCD |
| R1 | 1 | 616-02-03909 | | RES,39 OHM 5% 1/4W | ALLEN BRAD | RC07GF390J |
| R2 | 1 | 616-02-18009 | | RES,180 OHM 5% 1/4W | ALLEN BRAD | RC07GF181J |
| R3 | 1 | 616-02-10000 | | RES,1K 5% 1/4W | ALLEN BRAD | RC07GF102J |
| R14 | 1 | 616-02-10000 | | RES,1K 5% 1/4W | ALLEN BRAD | RC07GF102J |
| R15 | 1 | 616-02-03909 | | RES,39 OHM 5% 1/4W | ALLEN BRAD | RC07GF390J |
| R16 | 1 | 616-02-18009 | | RES,180 OHM 5% 1/4W | ALLEN BRAD | RC07GF181J |
| T1 | 1 | 262-99-00064 | 15802 | XFMR,OUTPUT | SPEC | 15802 (S/N 1 THRU 148) |
| T1 | 1 | 262-89-00043 | 15802-3 | XFMR, ASSY, OUTPUT | SPEC | 15802-3 (S/N 149 AND UP) |
| T2 | 1 | 262-99-00064 | 15802 | XFMR,OUTPUT | SPEC | 15802 (S/N 1 THRU 148) |
| T2 | 1 | 262-89-00043 | 15802-3 | XFMR, ASSY, OUTPUT | SPEC | 15802-3 (S/N 149 AND UP) |
| REF1 | 1 | 905-01-00378 | 16131 | SCHEMATIC | SPEC | 16131 |
| REF2 | 1 | 905-04-00002 | 9500-1 | SPEC,COMPONENT SPACING | SPEC | 9500-1 |

FIRST USAGE MODEL 4530

PARTS LIST 15906-2 REV DATE 08/19/68 REV LTR B

LIST TITLE PWA,CALIBRATE CARD EXT CA CHGE CONT NO. CODE IDENT SHT 1 OF
PART NO. 205-89-00497 ECO 34181 06141 CKD BY

| ITEM NO. | QTY REQD | E M R PART NUMBER | DRAWING OR SPEC NO. | DESCRIPTION | VENDOR NAME | VENDOR PART NUMBER |
|---|---|---|---|---|---|---|
| 1 | 1 | 204-99-00395 | 15905 | PWB,CALIBRATE | SPEC | 15905 |
| 2 | 26 | 065-98-00012 | | CONT,SOCKET | AMP | 85861-4 |
| 3 | A/R | 276-99-00008 | 619-22 | WIRE,#22,BUSS,SOLID | SPEC | 619-22 |
| 4 | A/R | 268-02-00039 | | TUBING,#22,EXTR TEF,CLEAR | QVL | MIL-I-22129 |
| CR1 | 1 | 088-10-41480 | | DIODE | JEDEC | 1N4148 |
| K1 | 1 | 219-98-00046 | | RELAY,2 FORM C CONTACTS | HATHAWAY INS | GP-2C-26-FCD |
| K3 | 1 | 219-98-00046 | | RELAY,2 FORM C CONTACTS | HATHAWAY INS | GP-2C-26-FCD |
| R1 | 1 | 616-02-03909 | | RES,39 OHM 5% 1/4W | ALLEN BRAD | RC07GF390J |
| R2 | 1 | 616-02-18009 | | RES,180 OHM 5% 1/4W | ALLEN BRAD | RC07GF181J |
| R3 | 1 | 616-02-10000 | | RES,1K 5% 1/4W | ALLEN BRAD | RC07GF102J |
| R14 | 1 | 616-02-10000 | | RES,1K 5% 1/4W | ALLEN BRAD | RC07GF102J |
| R15 | 1 | 616-02-03909 | | RES,39 OHM 5% 1/4W | ALLEN BRAD | RC07GF390J |
| R16 | 1 | 616-02-18009 | | RES,180 OHM 5% 1/4W | ALLEN BRAD | RC07GF181J |
| REF1 | 1 | 905-01-00378 | 16131 | SCHEMATIC | SPEC | 16131 |
| REF2 | 1 | 905-04-00002 | 9500-1 | SPEC,COMPONENT SPACING | SPEC | 9500-1 |

FIRST USAGE MODEL 4530

PARTS LIST 15906-3 REV DATE 08/19/68 REV LTR D

LIST TITLE PWA,CALIBRATE CARD INT CA CHGE CONT NO. CODE IDENT SHT 1 OF
PART NO. 205-89-00496 ECO 34181 06141 CKD BY

| ITEM NO. | QTY REQD | E M R PART NUMBER | DRAWING OR SPEC NO. | DESCRIPTION | VENDOR NAME | VENDOR PART NUMBER |
|---|---|---|---|---|---|---|
| 1 | 1 | 204-99-00395 | 15905 | PWB,CALIBRATE | SPEC | 15905 |
| 2 | 26 | 065-78-00012 | | CONT,SOCKET | AMP | 85861-4 |
| 3 | A/R | 276-99-00008 | 619-22 | WIRE,#22,BUSS,SOLID | SPEC | 619-22 |
| 4 | A/R | 268-02-00039 | | TUBING,#22,EXTR TEF,CLEAR | QVL | MIL-I-22129 |
| C1 | 1 | 337-23-68003 | 601 | CAP. 6.8MF 20% 35V | SPEC | 601 (S/N 1 THRU 80) |
| C1 | 1 | 337-22-15004 | 601 | CAP. 15MF 20% 20V | SPEC | 601 (S/N 81 AND UP) |
| C2 | 1 | 337-23-68003 | 601 | CAP. 6.8MF 20% 35V | SPEC | 601 (S/N 1 THRU 80) |
| C2 | 1 | 337-22-15004 | 601 | CAP. 15MF 20% 20V | SPEC | 601 (S/N 81 AND UP) |
| CR1 | 1 | 088-10-41480 | | DIODE | JEDEC | 1N4148 |
| CR2 | 1 | 088-10-41480 | | DIODE | JEDEC | 1N4148 |
| K1 | 1 | 219-98-00046 | | RELAY,2 FORM C CONTACTS | HATHAWAY INS | GP-2C-26-FCD |
| K2 | 1 | 219-98-00045 | | RELAY,2 FORM A CONTACTS | HATHAWAY INS | GP-2A-26-P |
| K3 | 1 | 219-98-00045 | | RELAY,2 FORM A CONTACTS | HATHAWAY INS | GP-2A-26-P |
| R1 | 1 | 616-02-03909 | | RES,39 OHM 5% 1/4W | ALLEN BRAD | RC07GF390J |
| R2 | 1 | 616-02-18009 | | RES,180 OHM 5% 1/4W | ALLEN BRAD | RC07GF181J |
| R3 | 1 | 616-02-10000 | | RES,1K 5% 1/4W | ALLEN BRAD | RC07GF102J |
| R4 | 1 | 999-01-00002 | 16246 | RES, *VOLT./VAR* | | |
| R5 | 1 | 201-98-00015 | | POT., 1K 10% 1W | AMPH. BORG | 2600P-102 BS1066 |
| R6 | 1 | 999-01-00002 | 16246 | RES, *VOLT./VAR* | | |
| R7 | 1 | 201-98-00015 | | POT., 1K 10% 1W | AMPH. BORG | 2600P-102 BS1066 |
| R8 | 1 | 999-01-00001 | 16246 | RES, *VOLT./VAR* | | |
| R9 | 1 | 999-01-00001 | 16246 | RES, *VOLT./VAR* | | |
| R10 | 1 | 999-01-00002 | 16246 | RES, *VOLT./VAR* | | |
| R11 | 1 | 201-98-00015 | | POT., 1K 10% 1W | AMPH. BORG | 2600P-102 BS1066 |

FIRST USAGE MODEL 4530

| ITEM NO. | QTY REQD | E M R PART NUMBER | DRAWING OR SPEC NO. | DESCRIPTION | VENDOR NAME | VENDOR PART NUMBER |
|---|---|---|---|---|---|---|
| R12 | 1 | 999-01-00002 | 16246 | RES, *VOLT./VAR* | | |
| R13 | 1 | 201-98-00015 | | POT., 1K 10% 1W | AMPH. BORG | 2600P-102 BS1066 |
| R14 | 1 | 616-02-10000 | | RES,1K 5% 1/4W | ALLEN BRAD | RC07GF102J |
| R15 | 1 | 616-02-03909 | | RES,39 OHM 5% 1/4W | ALLEN BRAD | RC07GF390J |
| R16 | 1 | 616-02-18009 | | RES,180 OHM 5% 1/4W | ALLEN BRAD | RC07GF181J |
| T1 | 1 | 262-99-00064 | 15802 | XFMR,OUTPUT | SPEC | 15802 (S/N 1 THRU 148) |
| T1 | 1 | 262-89-00043 | 15802-3 | XFMR, ASSY, OUTPUT | SPEC | 15802-3 (S/N 149 AND UP) |
| T2 | 1 | 262-99-00064 | 15802 | XFMR,OUTPUT | SPEC | 15802 (S/N 1 THRU 148) |
| T2 | 1 | 262-89-00043 | 15802-3 | XFMR, ASSY, OUTPUT | SPEC | 15802-3 (S/N 149 AND UP) |
| REF1 | 1 | 905-01-00377 | 16130 | SCHEMATIC | SPEC | 16130 |
| REF2 | 2 | 905-04-00002 | 9500-1 | SPEC,COMPONENT SPACING | SPEC | 9500-1 |

FIRST USAGE MODEL 4530

EMR - TELEMETRY

PARTS LIST 15906-4 REV DATE 08/19/68 REV LTR B

LIST TITLE PWA,CALIBRATE CARD INT CA CHGE CONT NO. CODE IDENT SHT 1 OF
PART NO. 205-89-00499 ECO 34181 06141 CKD BY

| ITEM NO. | QTY REQD | E M R PART NUMBER | DRAWING OR SPEC NO. | DESCRIPTION | VENDOR NAME | VENDOR PART NUMBER |
|---|---|---|---|---|---|---|
| 1 | 1 | 204-99-00395 | 15905 | PWB,CALIBRATE | SPEC | 15905 |
| 2 | 26 | 065-98-00012 | | CONT,SOCKET | AMP | 85861-4 |
| 3 | A/R | 276-99-00008 | 619-22 | WIRE,#22,BUSS,SOLID | SPEC | 619-22 |
| 4 | A/R | 268-02-00039 | | TUBING,#22,EXTR TEF,CLEAR QVL | | MIL-I-22129 |
| CR1 | 1 | 088-10-41480 | | DIODE | JEDEC | 1N4148 |
| CR2 | 1 | 088-10-41480 | | DIODE | JEDEC | 1N4148 |
| K1 | 1 | 219-98-00046 | | RELAY,2 FORM C CONTACTS | HATHAWAY INS | GP-2C-26-FCD |
| K2 | 1 | 219-98-00045 | | RELAY,2 FORM A CONTACTS | HATHAWAY INS | GP-2A-26-P |
| K3 | 1 | 219-98-00045 | | RELAY,2 FORM A CONTACTS | HATHAWAY INS | GP-2A-26-P |
| R1 | 1 | 616-02-03909 | | RES,39 OHM 5% 1/4W | ALLEN BRAD | RC07GF390J |
| R2 | 1 | 616-02-18009 | | RES,180 OHM 5% 1/4W | ALLEN BRAD | RC07GF181J |
| R3 | 1 | 616-02-10000 | | RES,1K 5% 1/4W | ALLEN BRAD | RC07GF102J |
| R4 | 1 | 999-01-00002 | 16246 | RES, *VOLT./VAR* | | |
| R5 | 1 | 201-98-00015 | | POT., 1K 10% 1W | AMPH. BORG | 2600P-102 BS1066 |
| R6 | 1 | 999-01-00002 | 16246 | RES, *VOLT./VAR* | | |
| R7 | 1 | 201-98-00015 | | POT., 1K 10% 1W | AMPH. BORG | 2600P-102 BS1066 |
| R8 | 1 | 999-01-00001 | 16246 | RES, *VOLT./VAR* | | |
| R9 | 1 | 999-01-00001 | 16246 | RES, *VOLT./VAR* | | |
| R10 | 1 | 999-01-00002 | 16246 | RES, *VOLT./VAR* | | |
| R11 | 1 | 201-98-00015 | | POT., 1K 10% 1W | AMPH. BORG | 2600P-102 BS1066 |
| R12 | 1 | 999-01-00002 | 16246 | RES, *VOLT./VAR* | | |
| R13 | 1 | 201-98-00015 | | POT., 1K 10% 1W | AMPH. BORG | 2600P-102 BS1066 |

FIRST USAGE MODEL 4530

| ITEM NO. | QTY REQD | E M R PART NUMBER | DRAWING OR SPEC NO. | DESCRIPTION | VENDOR NAME | VENDOR PART NUMBER |
|---|---|---|---|---|---|---|
| R14 | 1 | 616-02-10000 | | RES,1K 5% 1/4W | ALLEN BRAD | RC07GF102J |
| R15 | 1 | 616-02-03909 | | RES,39 OHM 5% 1/4W | ALLEN BRAD | RC07GF390J |
| R16 | 1 | 616-02-18009 | | RES,180 OHM 5% 1/4W | ALLEN BRAD | RC07GF181J |
| REF1 | 1 | 905-01-00377 | 16130 | SCHEMATIC | SPEC | 16130 |
| REF2 | 2 | 905-04-00002 | 9500-1 | SPEC,COMPONENT SPACING | SPEC | 9500-1 |

FIRST USAGE MODEL 4530

PARTS LIST 15796 REV DATE 08/19/68 REV LTR G

LIST TITLE P&A,VCO CHGE CONT NO. CODE IDENT SHT 1 OF
PART NO. 205-89-00406 ECO 39528 06141 CKD BY

| ITEM NO. | QTY REQD | E M R PART NUMBER | DRAWING OR SPEC NO. | DESCRIPTION | VENDOR NAME | VENDOR PART NUMBER |
|---|---|---|---|---|---|---|
| 1 | 1 | 204-89-00190 | 15795 | P&B,VCO | SPEC | 15795 |
| 2 | 1 | 239-99-00058 | 15733 | SPACER | SPEC | 15733 |
| 4 | 1 | 229-02-00066 | | SCREW,2-56X5/16 PAN HD | QVL | MS51957-4 |
| 5 | 1 | 273-02-00003 | | WASHER,#2, FLT ST STL | QVL | MS15795-802 |
| 6 | 3 | 049-98-00010 | | CLIP,THERMAL EQUALIZING | WAKEFIELD | 259-.25 |
| 7 | 2 | 189-98-00011 | | PAD,XSTR TO-5 8 PIN .075 | MILTON ROSS | 10193-DAP |
| 8 | 23 | 189-98-00004 | | PAD,XSTR TO-18 4 PIN,.15 | DEL BLINN | TP-100 |
| 9 | 6 | 065-98-00012 | | CONT,SOCKET | AMP | 85861-4 |
| C1 | 1 | 301-13-10002 | | CAP., .1MF &80-20 50V LS. | ERIE | 8131-050-651-104M |
| C2 | 1 | 304-20-20009 | 600 | CAP. 200PF 1% 500V | SPEC | 600 |
| C3 | 1 | 301-13-10002 | | CAP., .1MF &80-20 50V LS. | ERIE | 8131-050-651-104M |
| C4 | 1 | 304-13-05109 | 600 | CAP. 51PF 1% 500V | SPEC | 600 |
| C5 | 1 | 301-13-10002 | | CAP., .1MF &80-20 50V LS. | ERIE | 8131-050-651-104M |
| C6 | 1 | 337-20-39004 | 601 | CAP., 39MF 20% 10V | SPEC | 601 |
| C7 | 1 | 999-01-00002 | 16247 | CAP., *FREQ/VAR* | | |
| C8 | 1 | 304-01-00509 | 600 | CAP. 5PF .5PF 500V | SPEC | 600 |
| C9 | 1 | 305-20-20009 | 600 | CAP. 2000PF 1% 500V | SPEC | 600 |
| C10 | 1 | 301-13-10002 | | CAP., .1MF &80-20 50V LS. | ERIE | 8131-050-651-104M |
| C11 | 1 | 301-13-10002 | | CAP., .1MF &80-20 50V LS. | ERIE | 8131-050-651-104M |
| C12 | 1 | 301-13-10002 | | CAP., .1MF &80-20 50V LS. | ERIE | 8131-050-651-104M |
| C13 | 1 | 336-23-10003 | 601 | CAP., 1.0MF 20% 35V | SPEC | 601 |
| C14 | 1 | 301-71-10001 | | CAP., .01MF -20&80% 100V | ERIE | 805-000 X5V0 103Z |

FIRST USAGE MODEL 4530

| ITEM NO. | QTY REQD | E M K PART NUMBER | DRAWING OR SPEC NO. | DESCRIPTION | VENDOR NAME | VENDOR PART NUMBER |
|---|---|---|---|---|---|---|
| C15 | 1 | 999-01-00003 | 16247 | CAP., *FREQ/VAR* | | |
| C16 | 1 | 337-23-68003 | 601 | CAP. 6.8MF 20% 35V | SPEC | 601 |
| C17 | 1 | 304-08-03009 | 600 | CAP. 30PF .5PF 500V | SPEC | 600 |
| C18 | 1 | 337-23-68003 | 601 | CAP. 6.8MF 20% 35V | SPEC | 601 |
| C20 | 1 | 301-03-10001 | | CAP., .01 MF 20% 50V | | |
| CR1 | 1 | 088-10-41480 | | DIODE | JEDEC | 1N4148 |
| CR2 | 1 | 088-10-41480 | | DIODE | JEDEC | 1N4148 |
| CR3 | 1 | 088-99-00119 | 642-13 | DIODE,12V,400MW | SPEC | 642-13 |
| CR4 | 1 | 088-99-00329 | 642-07 | DIODE,6.2V,400MW | SPEC | 642-07 |
| CR5 | 1 | 088-10-41480 | | DIODE | JEDEC | 1N4148 |
| CR6 | 1 | 088-10-41480 | | DIODE | JEDEC | 1N4148 |
| CR7 | 1 | 088-99-00379 | 642-11 | DIODE,9.1V,400MW | SPEC | 642-11 |
| CR8 | 1 | 088-10-41480 | | DIODE | JEDEC | 1N4148 |
| CR9 | 1 | 088-10-41480 | | DIODE | JEDEC | 1N4148 |
| CR11 | 1 | 088-10-41480 | | DIODE | JEDEC | 1N4148 |
| CR12 | 1 | 088-10-41480 | | DIODE | JEDEC | 1N4148 |
| CR13 | 1 | 088-10-41480 | | DIODE | JEDEC | 1N4148 |
| CR14 | 1 | 088-10-41480 | | DIODE | JEDEC | 1N4148 |
| CR15 | 1 | 088-10-41480 | | DIODE | JEDEC | 1N4148 |
| CR16 | 1 | 088-10-41480 | | DIODE | JEDEC | 1N4148 |
| CR17 | 1 | 088-10-41480 | | DIODE | JEDEC | 1N4148 |
| CR18 | 1 | 088-10-41480 | | DIODE | JEDEC | 1N4148 |
| Q1 | 1 | 263-10-39470 | | XSTR | JEDEC | 2N3947 |
| Q2 | 1 | 263-10-39470 | | XSTR | JEDEC | 2N3947 |

| ITEM NO. | QTY REQD | E M R PART NUMBER | DRAWING OR SPEC NO. | DESCRIPTION | VENDOR NAME | VENDOR PART NUMBER |
|---|---|---|---|---|---|---|
| Q3 | 1 | 263-99-00139 | 805-1 | XSTR,PNP 2N3251 SW-AMP,50 | SPEC | 805-1 |
| Q4 | 1 | 263-10-39470 | | XSTR | JEDEC | 2N3947 |
| Q5 | 1 | 263-99-00139 | 805-1 | XSTR,PNP 2N3251 SW-AMP,50 | SPEC | 805-1 |
| Q6 | 1 | 263-99-00139 | 805-1 | XSTR,PNP 2N3251 SW-AMP,50 | SPEC | 805-1 |
| Q7 | 1 | 263-99-00139 | 805-1 | XSTR,PNP 2N3251 SW-AMP,50 | SPEC | 805-1 |
| Q8 | 1 | 263-10-39470 | | XSTR | JEDEC | 2N3947 |
| Q9 | 1 | 263-10-39470 | | XSTR | JEDEC | 2N3947 |
| Q10 | 1 | 263-10-39470 | | XSTR | JEDEC | 2N3947 |
| Q11 | 1 | 263-10-39470 | | XSTR | JEDEC | 2N3947 |
| Q12 | 1 | 263-10-39470 | | XSTR | JEDEC | 2N3947 |
| Q13 | 1 | 263-10-39470 | | XSTR | JEDEC | 2N3947 |
| Q14 | 1 | 263-10-39470 | | XSTR | JEDEC | 2N3947 |
| Q15 | 1 | 263-10-39470 | | XSTR | JEDEC | 2N3947 |
| Q16 | 1 | 263-10-39470 | | XSTR | JEDEC | 2N3947 |
| Q17 | 1 | 263-99-00139 | 805-1 | XSTR,PNP 2N3251 SW-AMP,50 | SPEC | 805-1 |
| Q18 | 1 | 263-10-39470 | | XSTR | JEDEC | 2N3947 |
| Q19 | 1 | 263-99-00139 | 805-1 | XSTR,PNP 2N3251 SW-AMP,50 | SPEC | 805-1 |
| Q20 | 1 | 263-10-39470 | | XSTR | JEDEC | 2N3947 |
| Q21 | 1 | 263-99-00139 | 805-1 | XSTR,PNP 2N3251 SW-AMP,50 | SPEC | 805-1 |
| Q22 | 1 | 263-99-00139 | 805-1 | XSTR,PNP 2N3251 SW-AMP,50 | SPEC | 805-1 |
| Q23 | 1 | 263-10-39470 | | XSTR | JEDEC | 2N3947 |
| Q24 | 1 | 263-10-39470 | | XSTR | JEDEC | 2N3947 |
| R1 | 1 | 608-09-12100 | 624 | RES. 1.21K OHM 1% 1/10W | SPEC | 624 |
| R2 | 1 | 608-09-11801 | 624 | RES, 11.8K 1% 1/10W | SPEC | 624 |

FIRST USAGE MODEL 4530

| ITEM NO. | QTY REQD | E M R PART NUMBER | DRAWING OR SPEC NO. | DESCRIPTION | VENDOR NAME | VENDOR PART NUMBER |
|---|---|---|---|---|---|---|
| R3 | 1 | 616-02-62009 | | RES,620 OHM 5% 1/4W | ALLEN BRAD | RC07GF621J |
| R4 | 1 | 201-98-00015 | | POT., 1K 10% 1W | AMPH. BORG | 2600P-102 BS1066 |
| R5 | 1 | 608-09-20009 | 624 | RES, 200.0 OHM 1% 1/10W | SPEC | 624 |
| R6 | 1 | 608-09-12100 | 624 | RES. 1.21K OHM 1% 1/10W | SPEC | 624 |
| R7 | 1 | 608-09-66500 | 624 | RES, 6.65K 1% 1/10W | SPEC | 624 |
| R8 | 1 | 201-98-00062 | | POT. 200 OHM 30% 1/2W | BECK INSTR | 62PR200 |
| R9 | 1 | 608-09-34000 | 624 | RES, 3.40K 1% 1/10W | SPEC | 624 |
| * R10 | 1 | 608-09-45309 | 624 | RES, 453.0 OHM 1% 1/10W | SPEC | 624 (S/N 1 THRU 18) |
| * R10 | 1 | 608-09-54909 | 624 | RES, 549.0 OHM 1% 1/10W | SPEC | 624 (S/N 19 AND UP) |
| R11 | 1 | 608-09-34000 | 624 | RES, 3.40K 1% 1/10W | SPEC | 624 |
| R12 | 1 | 608-09-10001 | 624 | RES. 10K 1% 1/10W | SPEC | 624 |
| R13 | 1 | 608-09-51101 | 624 | RES, 51.1K 1% 1/10W | SPEC | 624 |
| R14 | 1 | 201-98-00152 | | POT., 10K 20% .75W | BECKMAN | 78PR10K |
| R15 | 1 | 608-09-90901 | 624 | RES, 90.9K 1% 1/10W | SPEC | 624 |
| R16 | 1 | 608-09-10001 | 624 | RES. 10K 1% 1/10W | SPEC | 624 |
| R17 | 1 | 608-09-10001 | 624 | RES. 10K 1% 1/10W | SPEC | 624 |
| R18 | 1 | 608-09-10000 | 624 | RES. 1K 1% 1/10W | SPEC | 624 |
| R19 | 1 | 616-02-51002 | | RES,510K 5% 1/4W | ALLEN BRAD | RC07GF514J |
| R20 | 1 | 616-02-51002 | | RES,510K 5% 1/4W | ALLEN BRAD | RC07GF514J |
| R21 | 1 | 616-02-27009 | | RES,270 OHM 5% 1/4W | ALLEN BRAD | RC07GF271J |
| R22 | 1 | 616-02-20009 | | RES,200 OHM 5% 1/4W | ALLEN BRAD | RC07GF201J |
| R23 | 1 | 616-02-33000 | | RES,3.3K 5% 1/4W | ALLEN BRAD | RC07GF332J |
| R24 | 1 | 999-01-00001 | 16247 | RES, *DEV/VAR* | | |
| R25 | 1 | 608-09-20000 | 624 | RES. 2.0K 1% 1/10W | SPEC | 624 |
| R26 | 1 | 608-09-10001 | 624 | RES. 10K 1% 1/10W | SPEC | 624 |

FIRST USAGE MODEL 4530

* R10 IS A TEST VARIABLE (RANGE OF 400 TO 600 OHMS ±1% 1/10W)

| ITEM NO. | QTY REQD | E M R PART NUMBER | DRAWING OR SPEC NO. | DESCRIPTION | VENDOR NAME | VENDOR PART NUMBER |
|---|---|---|---|---|---|---|
| R27 | 1 | 608-09-10001 | 624 | RES. 10K 1% 1/10W | SPEC | 624 |
| R28 | 1 | 608-09-30100 | 624 | RES. 3.01K 1% 1/10W | SPEC | 624 |
| R29 | 1 | 608-09-45300 | 624 | RES, 4.53K 1% 1/10W | SPEC | 624 |
| R30 | 1 | 608-09-10001 | 624 | RES. 10K 1% 1/10W | SPEC | 624 |
| R31 | 1 | 616-02-39009 | | RES,390 OHM 5% 1/4W | ALLEN BRAD | RC07GF391J |
| R32 | 1 | 616-02-82009 | | RES,820 OHM 5% 1/4W | ALLEN BRAD | RC07GF821J |
| R33 | 1 | 608-09-20001 | 624 | RES. 20K 1% 1/10W | SPEC | 624 |
| R34 | 1 | 201-98-00159 | | POT., 100K 20% .75W | BECKMAN | 78PR100K |
| R35 | 1 | 608-09-40200 | 624 | RES, 4.02K 1% 1/10W | SPEC | 624 |
| R36 | 1 | 608-09-68100 | 624 | RES. 6.81K 1% 1/10W | SPEC | 624 |
| R37 | 1 | 201-98-00089 | | POT., 2K 10% 1W | AMPHENOL | 2600P-202 BS1066 |
| R38 | 1 | 608-09-28700 | 624 | RES, 2.87K 1% 1/10W | SPEC | 624 |
| R39 | 1 | 608-09-30100 | 624 | RES. 3.01K 1% 1/10W | SPEC | 624 |
| R40 | 1 | 608-09-88709 | 624 | RES, 887.0 OHM 1% 1/10W | SPEC | 624 |
| R41 | 1 | 608-09-57609 | 624 | RES, 576.0 OHM 1% 1/10W | SPEC | 624 |
| R42 | 1 | 616-02-13000 | | RES,1.3K 5% 1/4W | ALLEN BRAD | RC07GF132J |
| R43 | 1 | 616-02-56000 | | RES,5.6K 5% 1/4W | ALLEN BRAD | RC07GF562J |
| R44 | 1 | 616-02-10000 | | RES,1K 5% 1/4W | ALLEN BRAD | RC07GF102J |
| R45 | 1 | 608-09-20500 | 624 | RES. 2.05K 1% 1/10W | SPEC | 624 |
| R46 | 1 | 608-09-20000 | 624 | RES. 2.0K 1% 1/10W | SPEC | 624 |
| R47 | 1 | 616-02-30009 | | RES. 300 OHM 5% 1/4W | ALLEN BRAD | RC07GF301J |
| R48 | 1 | 616-02-51009 | | RES,510 OHM 5% 1/4W | ALLEN BRAD | RC07GF511J |
| R49 | 1 | 608-09-23700 | 624 | RES., 2.37K 1% 1/10W | SPEC | 624 |
| R50 | 1 | 616-02-12000 | | RES,1.2K 5% 1/4W | ALLEN BRAD | RC07GF122J |

FIRST USAGE MODEL 4530

| ITEM NO. | QTY REQD | E M R PART NUMBER | DRAWING OR SPEC NO. | DESCRIPTION | VENDOR NAME | VENDOR PART NUMBER |
|---|---|---|---|---|---|---|
| R51 | 1 | 616-02-51009 | | RES,510 OHM 5% 1/4W | ALLEN BRAD | RC07GF511J |
| R52 | 1 | 608-09-10001 | 624 | RES. 10K 1% 1/10W | SPEC | 624 |
| R53 | 1 | 608-09-15000 | 624 | RES, 1.50K 1% 1/10W | SPEC | 624 |
| R54 | 1 | 616-02-01809 | | RES,18 OHM 5% 1/4W | ALLEN BRAD | RC07GF180J |
| R55 | 1 | 616-02-15000 | | RES,1.5K 5% 1/4W | ALLEN BRAD | RC07GF152J |
| R56 | 1 | 201-98-00089 | | POT., 2K 10% 1W | AMPHENOL | 2600P-202 BS1066 |
| R57 | 1 | 608-09-30100 | 624 | RES. 3.01K 1% 1/10W | SPEC | 624 |
| R58 | 1 | 616-02-01809 | | RES,18 OHM 5% 1/4W | ALLEN BRAD | RC07GF180J |
| R59 | 1 | 616-02-51000 | | RES,5.1K 5% 1/4W | ALLEN BRAD | RC07GF512J |
| R60 | 1 | 201-98-00062 | | POT. 200 OHM 30% 1/2W | BECK INSTR | 62PR200 |
| R61 | 1 | 608-09-00000 | 624 | RES, *T/VAR* 1% 1/10W | | |
| R62 | 1 | 608-09-64909 | 624 | RES, 649.0 OHM 1% 1/10W | SPEC | 624 |
| R63 | 1 | 601-22-30000 | | RES,3K 3% 1W | DALE | RS-1A |
| R64 | 1 | 616-02-75000 | | RES,7.5K 5% 1/4W | ALLEN BRAD | RC07GF752J |
| R65 | 1 | 608-09-15000 | 624 | RES, 1.50K 1% 1/10W | SPEC | 624 |
| R66 | 1 | 616-02-75000 | | RES,7.5K 5% 1/4W | ALLEN BRAD | RC07GF752J |
| R67 | 1 | 608-09-49900 | 624 | RES. 4.99K 1% 1/10W | SPEC | 624 |
| R68 | 1 | 608-09-90900 | 624 | RES. 9.09K 1% 1/10W | SPEC | 624 |
| R69 | 1 | 608-01-02499 | 624 | RES, 24.9 OHM 1% 1/10W | SPEC | 624 |
| R70 | 1 | 616-02-51009 | | RES,510 OHM 5% 1/4W | ALLEN BRAD | RC07GF511J |
| R71 | 1 | 201-98-00089 | | POT., 2K 10% 1W | AMPHENOL | 2600P-202 BS1066 |
| R72 | 1 | 608-09-90909 | 624 | RES, 909.0 OHM 1% 1/10W | SPEC | 624 |
| R73 | 1 | 608-09-69809 | 624 | RES, 698.0 OHM 1% 1/10W | SPEC | 624 |
| R74 | 1 | 201-98-00121 | | POT., 50 OHM 10% .75W PC | BECKMAN | 79PR50 |

FIRST USAGE MODEL 4530

| ITEM NO. | QTY REQD | E M R PART NUMBER | DRAWING OR SPEC NO. | DESCRIPTION | VENDOR NAME | VENDOR PART NUMBER |
|---|---|---|---|---|---|---|
| R75 | 1 | 616-02-30000 | | RES,3K 5% 1/4W | ALLEN BRAD | RC07GF302J |
| R76 | 1 | 608-09-49900 | 624 | RES. 4.99K 1% 1/10W | SPEC | 624 |
| R77 | 1 | 608-09-15000 | 624 | RES. 1.50K 1% 1/10W | SPEC | 624 |
| R78 | 1 | 608-09-90900 | 624 | RES. 9.09K 1% 1/10W | SPEC | 624 |
| R79 | 1 | 608-01-02499 | 624 | RES. 24.9 OHM 1% 1/10W | SPEC | 624 |
| R80 | 1 | 608-09-10000 | 624 | RES. 1K 1% 1/10W | SPEC | 624 |
| R81 | 1 | 616-02-10000 | | RES,1K 5% 1/4W | ALLEN BRAD | RC07GF102J |
| R82 | 1 | 616-02-91000 | | RES,9.1K 5% 1/4W | ALLEN BRAD | RC07GF912J |
| R83 | 1 | 616-02-68009 | | RES,680 OHM 5% 1/4W | ALLEN BRAD | RC07GF681J |
| R84 | 1 | 201-98-00151 | | POT., 2K 20% .75W | BECKMAN | 78PR2K |
| R85 | 1 | 616-02-04709 | | RES,47 OHM 5% 1/4W | ALLEN BRAD | RC07GF470J |
| R86 | 1 | 616-02-10000 | | RES,1K 5% 1/4W | ALLEN BRAD | RC07GF102J |
| R87 | 1 | 616-02-62000 | | RES,6.2K 5% 1/4W | ALLEN BRAD | RC07GF622J |
| R88 | 1 | 616-02-22009 | | RES,220 OHM 5% 1/4W | ALLEN BRAD | RC07GF221J |
| R89 | 1 | 616-02-01009 | | RES,10 OHM 5% 1/4W | ALLEN BRAD | RC07GF100J |
| R90 | 1 | 616-02-01009 | | RES,10 OHM 5% 1/4W | ALLEN BRAD | RC07GF100J |
| R91 | 1 | 616-02-18001 | | RES,18K 5% 1/4W | ALLEN BRAD | RC07GF183J |
| R92 | 1 | 616-02-22009 | | RES,220 OHM 5% 1/4W | ALLEN BRAD | RC07GF221J |
| R93 | 1 | 608-09-88700 | 624 | RES. 8.87K 1% 1/10W | SPEC | 624 |
| R95 | 1 | 616-02-10009 | | RES,100 OHM 5% 1/4W | ALLEN BRAD | RC07GF101J |
| * R96 | 1 | 608-09-49909 | 624 | RES. 499.0 OHM 1% 1/10W | SPEC | 624 (S/N 1 THRU 18) |
| * R96 | 1 | 608-09-54909 | 624 | RES. 549.0 OHM 1% 1/10W | SPEC | 624 (S/N 19 AND UP) |
| Z1 | 1 | 046-18-00006 | | INTCKT,MA702C,DC AMPL | FCH | U5B770239X |
| Z2 | 1 | 046-18-00006 | | INTCKT,MA702C,DC AMPL | FCH | U5B770239X |
| REF1 | 1 | 905-01-00374 | 15794 | SCHEMATIC | SPEC | 15794 |

FIRST USAGE MODEL 4530

* R96 IS A TEST VARIABLE (400 TO 600 OHMS ±1%, 1/10W) ON UNIT SERIAL NUMBERS 88 AND UP

| ITEM NO. | QTY REQD | E M R PART NUMBER | DRAWING OR SPEC NO. | DESCRIPTION | VENDOR NAME | VENDOR PART NUMBER |
|---|---|---|---|---|---|---|
| XLF2 | 1 | 905-04-00002 | 9500-1 | SPEC,COMPONENT SPACING | SPEC | 9500-1 |

FIRST USAGE MODEL 4530

Table 6-2. Recommended Spares List

| PART DESCRIPTION | EMR STOCK NO. | VENDOR NAME | VENDOR PART NO. | TQ | RS |
|---|---|---|---|---|---|
| MODEL 4530-X1 | | | | | |
| INTEGRATED CIRCUIT, MA702C | 046-18-00006 | FCH | U5B770239X | 4 | 1 |
| DIODE | 088-10-41480 | JEDEC | 1N4148 | 32 | 4 |
| POTENTIOMETER, 2K ±10%, 1W | 201-98-00089 | Amphenol | 2600P-202-BS1066 | 6 | 1 |
| TRANSISTOR | 263-10-39470 | JEDEC | 2N3947 | 38 | 4 |
| TRANSISTOR | 263-99-00139 | Spec | 805-1 | 22 | 3 |
| CAPACITOR, 0.1 μf +80% −20%, 50V | 301-14-10002 | Erie | 8131-050-651-104Z | 12 | 2 |
| CAPACITOR, 1.0 μf ±20%, 35V | 336-23-10003 | Spec | 601 | 6 | 1 |
| CAPACITOR, 6.8 μf ±20%, 35V | 337-23-68003 | Spec | 601 | 6 | 1 |
| RESISTOR, 1.50K ±1%, 1/10W | 608-09-15000 | Spec | 624 | 6 | 1 |
| RESISTOR, 3.01K ±1%, 1/10W | 608-09-30100 | Spec | 624 | 6 | 1 |
| RESISTOR, 9.09K ±1%, 1/10W | 608-09-90900 | Spec | 624 | 8 | 1 |
| RESISTOR, 10K ±1%, 1/10W | 608-09-10001 | Spec | 624 | 14 | 2 |
| RESISTOR, 510 Ω ±5%, 1/4W | 616-02-51009 | Allen Bradley | RC07GF511J | 6 | 1 |
| RESISTOR, 1K ±5%, 1/4W | 616-02-10000 | Allen Bradley | RC07GF102J | 8 | 1 |
| RESISTOR, 1.5K ±5%, 1/4W | 616-02-15000 | Allen Bradley | RC07GF152J | 6 | 1 |
| RESISTOR, 9.1K ±5%, 1/4W | 616-02-91000 | Allen Bradley | RC07GF912J | 6 | 1 |
| RESISTOR, 10K ±5%, 1/4W | 616-02-10001 | Allen Bradley | RC07GF103J | 8 | 1 |
| MODEL 4530-X2 | | | | | |
| INTEGRATED CIRCUIT, MA702C | 046-18-00006 | FCH | U5B770239X | 4 | 1 |
| DIODE | 088-10-41480 | JEDEC | 1N4148 | 33 | 4 |
| POTENTIOMETER, 2K ±10%, 1W | 201-98-00089 | Amphenol | 2600P-202-BS1066 | 6 | 1 |
| TRANSISTOR | 263-10-39470 | JEDEC | 2N3947 | 38 | 4 |
| TRANSISTOR | 263-99-00139 | Spec | 805-1 | 22 | 3 |
| CAPACITOR, 0.1 μf +80% −20%, 50V | 301-14-10002 | Erie | 8131-050-651-104Z | 12 | 2 |
| CAPACITOR, 1.0 μf ±20%, 35V | 336-23-10003 | Spec | 601 | 6 | 1 |

Table 6-2 (Cont'd.). Recommended Spares List

| PART DESCRIPTION | EMR STOCK NO. | VENDOR NAME | VENDOR PART NO. | TQ | RS |
|---|---|---|---|---|---|
| CAPACITOR, 6.8 μf ±20%, 35V | 337-23-68003 | Spec | 601 | 6 | 1 |
| RESISTOR, 1.50K ±1%, 1/10W | 608-09-15000 | Spec | 624 | 6 | 1 |
| RESISTOR, 3.01K ±1%, 1/10W | 608-09-30100 | Spec | 624 | 6 | 1 |
| RESISTOR, 9.09K ±1%, 1/10W | 608-09-90900 | Spec | 624 | 8 | 1 |
| RESISTOR, 10K ±1%, 1/10W | 608-09-10001 | Spec | 624 | 14 | 2 |
| RESISTOR, 510 Ω ±5%, 1/4W | 616-02-51009 | Allen Bradley | RC07GF511J | 6 | 1 |
| RESISTOR, 1K ±5%, 1/4W | 616-02-10000 | Allen Bradley | RC07GF102J | 8 | 1 |
| RESISTOR, 1.5K ±5%, 1/4W | 616-02-15000 | Allen Bradley | RC07GF152J | 6 | 1 |
| RESISTOR, 9.1K ±5%, 1/4W | 616-02-91000 | Allen Bradley | RC07GF912J | 6 | 1 |
| RESISTOR, 10K ±5%, 1/4W | 616-02-10001 | Allen Bradley | RC07GF103J | 8 | 1 |
| MODEL 4530-X3 | | | | | |
| INTEGRATED CIRCUIT, MA702C | 046-18-00006 | FCH | U5B770239X | 4 | 1 |
| DIODE | 088-10-41480 | JEDEC | 1N4148 | 34 | 4 |
| POTENTIOMETER, 1K ±10%, 1W | 201-98-00015 | Amp. Borg | 2600P-102-BS1066 | 6 | 1 |
| TRANSISTOR | 263-10-39470 | JEDEC | 2N3947 | 38 | 4 |
| TRANSISTOR | 263-99-00139 | Spec | 805-1 | 22 | 3 |
| CAPACITOR, 0.1 μf +80% −20%, 50V | 301-14-10002 | Erie | 8131-050-651-104Z | 12 | 2 |
| CAPACITOR, 1.0 μf ±20%, 35V | 336-23-10003 | Spec | 601 | 6 | 1 |
| CAPACITOR, 6.8 μf ±20%, 35V | 337-23-68003 | Spec | 601 | 6 | 1 |
| RESISTOR, 1.50K ±1%, 1/10W | 608-09-15000 | Spec | 624 | 6 | 1 |
| RESISTOR, 3.01K ±1%, 1/10W | 608-09-30100 | Spec | 624 | 6 | 1 |
| RESISTOR, 9.09K ±1%, 1/10W | 608-09-90900 | Spec | 624 | 8 | 1 |
| RESISTOR, 10K ±1%, 1/10W | 608-09-10001 | Spec | 624 | 14 | 2 |
| RESISTOR, 510 Ω ±5%, 1/4W | 616-02-51009 | Allen Bradley | RC07GF511J | 6 | 1 |
| RESISTOR, 1K ±5%, 1/4W | 616-02-10000 | Allen Bradley | RC07GF102J | 8 | 1 |
| RESISTOR, 1.5K ±5%, 1/4W | 616-02-15000 | Allen Bradley | RC07GF152J | 6 | 1 |
| RESISTOR, 9.1K ±5%, 1/4W | 616-02-91000 | Allen Bradley | RC07GF912J | 6 | 1 |
| RESISTOR, 10K ±5%, 1/4W | 616-02-10001 | Allen Bradley | RC07GF103J | 8 | 1 |

Table 6-2 (Cont'd.). Recommended Spares List

| PART DESCRIPTION | EMR STOCK NO. | VENDOR NAME | VENDOR PART NO. | TQ | RS |
|---|---|---|---|---|---|
| MODEL 4530-X4 | | | | | |
| INTEGRATED CIRCUIT, MA702C | 046-18-00006 | FCH | U5B770239X | 4 | 1 |
| DIODE | 088-10-41480 | JEDEC | 1N4148 | 34 | 4 |
| POTENTIOMETER, 1K ±10%, 1W | 201-98-00015 | Amp. Borg | 2600P-102-BS1066 | 6 | 1 |
| TRANSISTOR | 263-10-39470 | JEDEC | 2N3947 | 38 | 4 |
| TRANSISTOR | 263-99-00139 | Spec | 805-1 | 22 | 3 |
| CAPACITOR, 0.1 µf +80% -20%, 50V | 301-14-10002 | Erie | 8131-050-651-104Z | 12 | 2 |
| CAPACITOR, 1.0 µf ±20%, 35V | 336-23-10003 | Spec | 601 | 6 | 1 |
| CAPACITOR, 6.8 µf ±20%, 35V | 337-23-68003 | Spec | 601 | 6 | 1 |
| RESISTOR, 1.50K ±1%, 1/10W | 608-09-15000 | Spec | 624 | 6 | 1 |
| RESISTOR, 3.01K ±1%, 1/10W | 608-09-30100 | Spec | 624 | 6 | 1 |
| RESISTOR, 9.09K ±1%, 1/10W | 608-09-90900 | Spec | 624 | 8 | 1 |
| RESISTOR, 10K ±1%, 1/10W | 608-09-10001 | Spec | 624 | 14 | 2 |
| RESISTOR, 510 Ω ±5%, 1/4W | 616-02-51009 | Allen Bradley | RC07GF511J | 6 | 1 |
| RESISTOR, 1K ±5%, 1/4W | 616-02-10000 | Allen Bradley | RC07GF102J | 8 | 1 |
| RESISTOR, 1.5K ±5%, 1/4W | 616-02-15000 | Allen Bradley | RC07GF152J | 6 | 1 |
| RESISTOR, 9.1K ±5%, 1/4W | 616-02-91000 | Allen Bradley | RC07GF912J | 6 | 1 |
| RESISTOR, 10K ±5%, 1/4W | 616-02-10001 | Allen Bradley | RC07GF103J | 8 | 1 |

Table 6-3. Vendor List

| ABBREV. | VENDOR NAME AND ADDRESS |
|---|---|
| ALCO | Alco Electronics Manufacturing Co., Lawrence, Mass. |
| ALLEN BRAD | Allen-Bradley Co., Milwaukee, Wis. |
| ALPHLEX | Alpha Wire Corp., Elizabeth, N.Y. |
| AMATHOM | Amathom Electronic Hdwr. Co., Inc., New Rochelle, N.Y. |
| AMER SEALANT | American Sealants Co., Hartford, Conn. |
| AMPEREX | Amperex Electronic Co., Hicksville, N.Y. |
| AMPH BORG | Amphenol Corp., Broadview, Ill. |
| AMPHENOL | Amphenol Corp., Los Gatos, Calif. |
| AMP INC. | Amp, Inc., Harrisburg, Pa. |
| BECK INSTR | Beckman Instruments, Inc., Fullerton, Calif. |
| BECKMAN | Beckman Instruments, Inc., Fullerton, Calif. |
| BIRNBACH | Birnbach Radio Co., Inc., New York, N.Y. |
| BURNDY | Burndy Corp., Norwalk, Conn. |
| CARR FAST | Carr Fastener Co., Cambridge, Mass. |
| CKT STRU | Circuit Structures Lab., Santa Ana, Calif. |
| CLAROSTAT | Clarostat Mfg. Co., Dover, N.H. |
| DEL BLINN | Delbert/Blinn Co., Pomona, Calif. |
| EECO | Engineered Electronics Co., Inc., Santa Ana, Calif. |
| E.F. JOHNSON | E.F. Johnson Co., Waseca, Minn. |
| ERIE | Erie Technological Products, Inc., Erie, Pa. |
| FCH | Fairchild Camera and Instrument Corp., Mountain View, Calif. |
| GEN CEMENT | General Cement Division of Textron, Inc., Rockford, Ill. |

Table 6-3 (Cont'd.). Vendor List

| ABBREV. | VENDOR NAME AND ADDRESS |
|---|---|
| HARTWELL | Hartwell Corp., Los Angeles, Calif. |
| HATHAWAY INS. | Hathaway Instruments, Inc., Denver, Colorado |
| H. H. SMITH | Herman H. Smith, Inc., Brooklyn, N.Y. |
| HUBBELL | Harvey Hubbel, Inc., Bridgeport, Conn. |
| JEDEC | |
| LITTELFUSE | Littlefuse, Inc., Des Plaines, Ill. |
| MILTON ROSS | Milton Ross Metals Co., Southampton, Pa. |
| MOT | Motorola Semiconductor Products, Inc., Phoenix, Ariz. |
| PENDAR | Clare-Pendar, Inc., Post Falls, Idaho |
| QVL | Qualified Vendor List |
| RIEDON | Riedon Avionics, Inc., Van Nuys, Calif. |
| ROSS MFG | Ross Mfg., Co., Cleveland, Ohio |
| ROTRON MFG | Rotron Manufacturing Co., Inc., Woodstock, N.Y. |
| SCANBE | Scanbe Mfg. Corp., Monterey Park, Calif. |
| SEALECTRO | Sealectro Corp., Mamaroneck, N.Y. |
| SEASTROM | Seatrom Mfg. Co., Glendale, Calif. |
| SHAKEPROOF | Shakeproof Division of Illinois Tool Works, Inc., Elgin, Ill. |
| SOUTHCO | South Coast Co., Newport Beach, Calif. |
| SPEC (EMR) | Electro-Mechanical Research, Inc., Sarasota, Fla. |
| SPRAGUE | Sprague Electric Corp., Bristol, Conn. |
| SUPERIOR | Superior Electric Co., Bristol, Conn. |
| WAKEFIELD | Wakefield Engineering, Inc., Wakefield, Mass. |

Table 6-4. Customer Provisioning Questionnaire

| | |
|---|---|
| 1. | Equipment to be spared<br>Model No. (s): _____<br>Serial No. (s): _____ |
| 2. | Number of equipments to be spared in each location _____ |
| 3. | Operating time and cycle: _____ hours/day, _____ day/week. |
| 4. | Operating Environment:<br>A. Temperature: _____<br>B. Humidity: _____<br>C. Altitude: _____<br>D. Shock and Vibration: _____ |
| 5. | Non-operating Environment: _____<br>A. Temperature: _____<br>B. Humidity: _____<br>C. Altitude: _____ |
| 6. | Desired probability of being able to spare from complement _____ percent for _____ months. |
| 7. | Can usage permit troubleshooting to parts level when a failure occurs? _____ |
| 8. | What spare assemblies do you have that are used in this Model Equipment? _____ |
| 9. | Do you wish us to exclude the EMR warranty period? _____ |

# TECHNICAL MANUAL UTILITY REPORT

At EMR, we continuously strive to produce high quality and usable technical manuals for our equipment. To help us in this regard, we request that after reading and using this manual, you record your comments and suggestions on this utility report and return it to EMR. When completed, remove this page from manual, fold on dotted lines, staple, and mail. Insert additional sheets if necessary.

Manual Title and Publication Date:

_____

_____

_____

_____

Report Submitted By:

Name _____

Title _____

Orgn. _____

Date _____

Comments or Suggestions:

(Fold along this line)

FIRST CLASS
Permit No. 329
Sarasota, Fla.

**BUSINESS REPLY MAIL**
No Postage Stamp Necessary if Mailed in the United States

(Staple here)

Postage will be paid by

**EMR-TELEMETRY**
**P. O. BOX 3041**
**SARASOTA, FLA. 33578**

Attn: Technical Publications
Mail Stop No. 22

(Fold along this line)

www.manualsplus.com
1000420